The Interpersonal Determinants of Green Purchasing:

An assessment of the empirical record

by

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ABSTRACT

This study investigates how well prominent behavioral theories from social psychology explain green purchasing behavior (GPB). I assess three prominent theories in terms of their suitability for GPB research, their attractiveness to GPB empiricists, and the strength of their empirical evidence when applied to GPB. First, a qualitative assessment of the Theory of Planned Behavior (TPB), Norm Activation Theory (NAT), and Value-Belief-Norm Theory (VBN) is conducted to evaluate a) how well the phenomenon and concepts in each theory match the characteristics of pro-environmental behavior and b) how well the assumptions made in each theory match common assumptions made in purchasing theory. Second, a quantitative assessment of these three theories is conducted in which r^2 values and methodological parameters (e.g., sample size) are collected from a sample of 21 empirical studies on GPB to evaluate the accuracy and generalize-ability of empirical evidence.

In the qualitative assessment, the results show each theory has its advantages and disadvantages. The results also provide a theoretically-grounded roadmap for modifying each theory to be more suitable for GPB research. In the quantitative assessment, the TPB outperforms the other two theories in every aspect taken into consideration. It proves to 1) create the most accurate models 2) be supported by the most generalize-able empirical evidence and 3) be the most attractive theory to empiricists.

Although the TPB establishes itself as the best foundational theory for an empiricist to start from, it's clear that a more comprehensive model is

needed to achieve consistent results and improve our understanding of GPB. NAT and the Theory of Interpersonal Behavior (TIB) offer pathways to extend the TPB. The TIB seems particularly apt for this endeavor, while VBN does not appear to have much to offer.

Overall, the TPB has already proven to hold a relatively high predictive value. But with the state of ecosystem services continuing to decline on a global scale, it's important for models of GPB to become more accurate and reliable. Better models have the capacity to help marketing professionals, product developers, and policy makers develop strategies for encouraging consumers to buy green products.

DEDICATION

To Lucas, Delaney, Isla and the next generation of Redds.

ACKNOWLEDGMENTS

I would like to thank M&D, P&A, and J&J for all the love and support over the years. I would also like to express my gratitude to Kevin Dooley, Robert Kutter and the rest of the TSC family for all their help along the way. Last, but not least, I would like to thank Sara Koda for all the late night meals, fretful phone calls, and somniferous head scratches. This thesis would not have been possible without the support of these wonderful people.

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"We need to begin to manage this planet as if our life depended on it; because it does, it fundamentally does." – Jason Clay, VP at WWF

The difference between living organisms and non-living physical elements is that in order for living organisms to exist, they require a continuous and adequate supply of matter and energy (Miller, 1965). Humans, like all other organisms, depend on ecosystem services to provide the specific types of matter and energy necessary for creating conditions that enable a healthy and secure existence (Reid, Mooney, Cropper, & Capistrano, 2005). Both modern and ancient civilizations have always depend on ecosystem services to provide them with heat, light, water and various types of minerals, vitamins, foods, and fuels (Miller, 1965).

Population growth, increasing affluence, and technological innovation have caused humans to have an unprecedented influence on ecosystems and their ability to meet our biological, cultural, and economics demands (Holdren, 2000; Reid et al., 2005). From 1950 to the early 1990s, world population more than doubled, grain production almost tripled, energy production more than quadrupled, and global GDP quintupled (Kates, 2000). Around the same time frame, approximately 70% of the ecosystem services classified as provisioning or regulating were either degraded or used unsustainably at a global scale. Provisioning services that have degraded over the past 50 years include the production of fiber, freshwater, and bio-chemicals. Regulating services that have degraded include air and water purification. Here are just a few statistics from the rather grim Millennium Ecosystem Assessment from which the previous conclusions were reached: 5-

20% of global freshwater use exceeds the sustainable consumption rate; 10-30% of mammal, bird, and amphibian species are threatened with extinction; the proportion of ocean fisheries with depleted stocks of fish has increased from 4% in 1950 to 25% in 2000 (Percy & Lubchencho, 2005). In summary, 1) consumption is a fundamental aspect of life 2) ecosystems are collectively the only life-support system on earth 3) the magnitude of human demand and how we have chosen to meet that demand has changed drastically since the industrial revolution 4) our current production-and-consumption systems are causing vast amounts of degradation to the world's ecosystems—aka our life support system.

Investing in Sustainability Science research is one way to develop solutions to the unsustainable pattern of consumption described above. The core focus in Sustainability Science is advancing our understanding of coupled human-environmental systems and engaging in focused problem-solving efforts that provide useful knowledge for meeting human needs and sustaining the life support systems of the planet (Clark, 2007). One of the core questions in Sustainability Science is, "What systems of incentive structures – including markets, rules, norms, and scientific information – can most effectively improve social capacity to guide interactions between nature and society towards more sustainable trajectories?" (Kates et al., 2001). A key component of this broad question is, what incentive structures are necessary to change purchasing behavior and shift demand towards more sustainable products? In other words, how do we design effective behavioral-change campaigns? The first step towards answering this question is gaining an

understanding of what makes people act in environmentally responsible ways and more specifically, make makes people buy green products.

Many researchers have examined the causes of pro-environmental behavior (PEB). During the 1970s and 80s, most researchers approached this topic in a very exploratory and empirical manner. As a result, a myriad of casual factors can be found in the literature. But many of them have only proven to hold explanatory power when studied in isolation. Starting in 1990, many empiricists turned away from the exploratory approach to PEB research and began to apply well-established models from social psychology. These models are attractive to researchers because 1) their constructs and the relationships between them are heavily grounded in theory and 2) instructions on how to operationalize the constructs are often available. Due to the often inter-disciplinary nature of PEB research, however, it's a challenge for researchers to know which explanatory model from social-psychology is most appropriate to apply to the specific type of PEB they are examining (Bamberg & Schmidt, 2003).

Although the adoption of social-psychological theories has lead to empirical research that is more systematic than the exploratory research conducted in the 1970s and 80s, it's still not clear how effective social-psychological theories have been when applied to green purchasing. There are two primary reasons for this knowledge gap. One, the broad nature of the PEB concept has enabled past researchers to use a wide range of behaviors to measure it; from recycling to policy support. Two, researchers have often downplayed their measurement techniques and generalized their findings to

apply to all pro-environmental behaviors. In summary, the ambiguous language and diverse measurement techniques used in empirical research on PEB has created a knowledge gap for researchers who wish to investigate specific actions like green purchasing behavior (GPB). Hence, the research question for this study is, "How well do theories from social psychology explain the determinants of green purchasing behavior?" To answer that question, I pose the following more specific questions:

1. What social-psychological theories are most commonly used to explain pro-environmental behavior?
2. Of these, which social-psychological theories are most frequently applied to GPB?
3. How strong is the empirical evidence supporting the three social-psychological theories that are most frequently applied to GPB?

A combination of methods is used to answer the aforementioned research questions. The study starts with a literature review and qualitative analysis of prominent behavioral theories from social psychology that have been applied to PEB. Then a snowball sampling method is used to create a sample frame of empirical studies that have tested the validity of one or more of these theories in the PEB domain, starting with review articles and meta-analysis studies. Next, empirical studies that used behavioral measures of GPB are selected for inclusion in the final sample. Then primary data is collected from the final sample of empirical studies to assess the accuracy and generalize-ability of empirical evidence. The accuracy (i.e., explanatory power) of empirical models is evaluated using r^2 values, while methodological parameters (e.g., sample size) are coded to evaluate the generalize-ability of

their conclusions. Lastly, the data is analyzed using basic statistical procedures that describe the variance and central tendencies in the data. The Methods section describes this procedure in greater detail.

The results provide objective conclusions about the relative merits of competing social-psychological theories and reveal which one most accurately represents the factors that motivate consumers to purchase green products. The qualitative results provide a theoretically grounded roadmap for modifying each social-psychological theory to be more suitable for GPB research. The quantitative results highlight improvement opportunities for the social-psychological theories as well. But unlike the qualitative results, they also identify the best theory to start from if you an empiricist aiming to build an explanatory model of GPB. Although the quantitative results highlight the need for a more comprehensive meta-model to increase our understanding of GPB, the results still provide marketing professionals with some guidance on how to develop effective promotional strategies for green product lines today.

Chapter 2

SCOPE

This study does not seek to understand what causes consumers to buy more or less products. Nor does it seek to understand how to convince consumers to buy fewer products in the future. Instead, this study focuses on what causes consumers to choose one product over another. More specifically, and in line with the value-laden nature of Sustainability Science research, this study seeks to understand how to shift consumers' purchasing behavior away from products with a high environmental impact and towards products with a low environmental impact. This distinction is graphically displayed in the equation below (Kates, 2000).

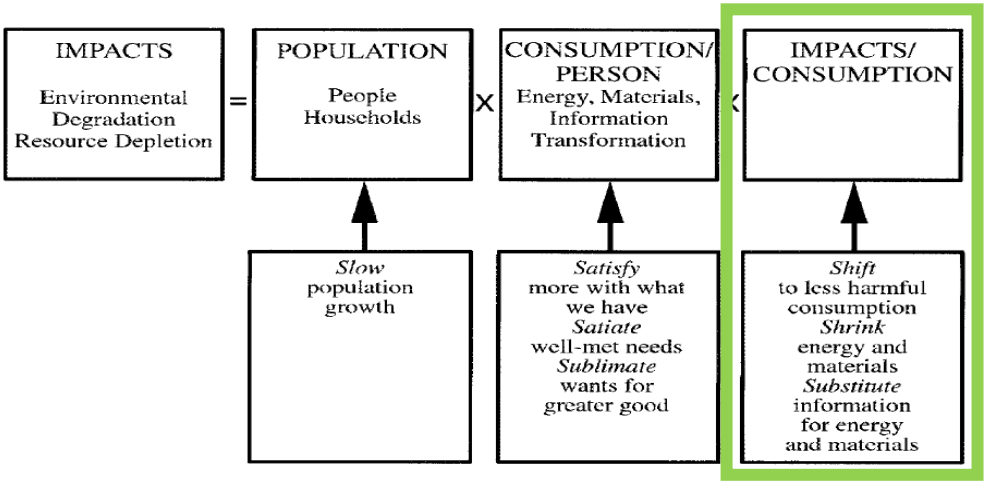

Figure 1. The environmental impact equation proposed by Robert Kates (2000) as an alternative to the IPAT equation.

A more implicit aspect of this graphic is that it focuses solely on environmental degradation and thereby, ignores the "social" pillar of sustainability that tends to consider issues of social justice, human health and safety, or education. When applied to the topic of consumption, this means that ethical consumerism and what motivates consumers to purchase

pro-social products such as fair trade coffee is ignored in this study. The focus of this study is limited to what motivates consumers to purchase environmentally preferable products.

Chapter 3

METHODS

Qualitative Analysis

The qualitative analysis consists of three major steps. First, a literature review is conducted to identify prominent theories from social-psychology that have been applied to PEB. Second, the original publications that postulated these theories are reviewed in order to analyze each theory from a descriptive approach.

Third, characteristics of three theories from social psychology that have been commonly applied to GPB are compared to characteristics of GPB using established criteria for importing theories from one discipline to another (Amundson, 1998). These three theories were identified using the sampling procedure described below. The aim of this additional analysis is to better understand how well the phenomena, concepts, and underlying assumptions present in a given social-psychological theory align with the corresponding characteristics of GPB theory. It ignores the methodological choices of empiricists and focuses on the inherent characteristics of theories to assess how appropriate it is for them to be applied.

Since GPB doesn't have its own discipline or local theories to use in these comparisons, three frameworks from the sustainable consumption and PEB literature are used as proxies for local GPB theory. The frameworks were selected from review articles that sought to synthesize a plethora of previous research. For phenomena, three characteristics of PEB were derived from a meta-analysis conducted by Henk Staats (Staats, 2003). For concepts,

five types of interpersonal concepts commonly used to explain PEB are derived from the 'levels of causality' framework proposed by Gardner and Stern (Gardner & Stern, 1996). For assumptions, an adapted typology of four common assumptions underlying purchasing theory is utilized (Jackson, 2005). Together, these typologies form the qualitative assessment framework displayed below.

Table 1

Qualitative Assessment Framework

Dimension of Appropriateness	Characteristic of GPB
Match of Phenomena	Social Dilemma
	Spatial Dilemma
	Temporal Dilemma
Match of Concepts	Values and Worldviews
	Beliefs and Expectations
	Attitudes and Norms
	Knowledge
	Attention and Recollection
Match of Assumptions	Self-interest Consumption
	Evolutionary Consumption
	Ordinary Consumption
	Symbolic Consumption

Sampling

A snowball sampling method is used to create the sample frame of empirical studies that have tested the validity of one or more of these theories in the PEB domain, starting with review articles and meta-analysis studies. Each empirical study in the frame is coded for two binary criteria to determine whether or not the study addresses green purchasing behavior.

To determine whether a study addresses "green" behavior, the measurements of behavior will be compared to Stern's (2000) definition of environmentally significant behavior. It should be noted that both the intent-oriented and impact-oriented definitions will be considered (Stern, 2000). If behavioral measures are presented to respondents as environmentally beneficial, then they comply with the intent-oriented definition. If the researcher determines, based on expert judgment, that the behavioral measures significantly reduce negative environmental impacts, then they comply with the impact-oriented definition. In the later case, behavioral measures are not required to be presented to respondents as environmentally beneficial.

To determine whether a study addresses purchasing behavior, the measurements of behavior will be compared to Blackwell et al.'s (2006) definition of the acquisition stage of consumer behavior. This means that all activities before and during the purchase of a product or service will be considered in-scope, while all activities related to the use (i.e., consumption) or disposal of a product or its packaging will be considered out of scope (Blackwell, Miniard, & Engel, 2006).

Only studies that are coded as fulfilling both the green and purchasing criteria will be selected for the final sample. It's also important to note that the codes will be applied based on the presence of one or more in-scope behavioral measures. In other words, the empirical studies are not required to solely examine green purchasing behavior. This procedure allows studies that use a mixture of behavioral measures to qualify for the final sample.

Quantitative Analysis

The quantitative analysis consists of four major steps. First, the frequency of application is calculated for each social-psychological theory present in the final sample of empirical studies. These metrics enable us to quantify how attractive empiricists have found each social-psychological theory to be when investigating GPB.

Second, the empirical studies are coded for six criteria to quantitatively evaluate the quality of empirical evidence reported in each publication. Each criterion is used to assess either the accuracy or generalize-ability dimensions of quality (Weick, 1999). The generalize-ability dimension is disaggregated into population and behavioral generalize-ability. The two criteria pertaining to accuracy are r^2 values. One is calculated with the intention construct (or equivalent) as the dependent variable, while the other is calculated with actual behavioral measures as the dependent variable. When available, the adjusted r^2 values replace the regular r^2 values. The population generalize-ability criteria are sample size, number of markets, and representativeness of the sample. The behavioral generalize-ability criterion is the behavioral measure used in a given study. Together, these six criteria constitute the quantitative assessment framework that is used to evaluate empirical evidence.

Table 2

Quantitative Assessment Framework

Dimension of Quality	Criteria
Accuracy	r^2 value with intention as dependent variable
	r^2 value with behavior as dependent variable
Population Generalize-ability	Sample size
	Number of markets
	Representativeness of the sample
Behavioral Generalize-ability	Behavioral measures

Third, each empirical study is classified as having a high, medium, or low value on the scales of population and behavioral generalize-ability. These evaluations are based on the range of values in the analytical spreadsheet that correspond to the four aforementioned generalize-ability criteria. Four, the data in the analytical spreadsheet is analyzed using basic statistical procedures that describe the variance and central tendencies in the data (Johnson & Bhattacharyya, 2006). These results are used to determine which theory is supported by the strongest empirical evidence.

Materials

Two spreadsheets will be created in Microsoft Excel to facilitate the data collection and analytical procedures. One spreadsheet will be used during the creation of the sample frame to keep track of root articles, the empirical studies that were referenced in each root article, and their respective measurements of behavior. This spreadsheet will also be used to code each empirical study for the two green purchasing criteria described

above. The second spreadsheet will house the quantitative assessment framework. It will be used to record specific pieces of textual or numerical data from the sample of green purchasing publications and apply ordinal codes (e.g., High, Medium, Low) based on expert judgment. The quantitative assessment framework consists of six criteria and each one has a designated column in the spreadsheet.

Chapter 4

LITERATURE REVIEW OF PROMINENT BEHAVIORAL THEORIES IN SOCIAL PSYCHOLOGY

In this section, I describe five prominent behavioral theories in social psychology that were originally designed to be highly generalize-able, but more recently have been particularly popular to apply to PEB. Interestingly, all of them were either originally postulated in the 1970s or are deeply rooted in theory that was posited in the 1970s. In addition, most of the original publications make sure to acknowledge the accomplishments and/or point out the flaws of one or two of the other theories reviewed here. The aim of this section is to summarize the premise of each theory that contributed to this renaissance era of social-psychological theory and elucidate the key points of differentiation between them.

Theory of Interpersonal Behavior

The Theory of Interpersonal Behavior (TIB) was postulated by Harry Triandis (Triandis, 1977) and can be best described using 3 formulas. The first of which is presented below.

$$P_a = (w_H H + w_I I)P \times F \qquad (1)$$

The notation in this equation is described below.

- Pa is the probability of the act
- H is habit to perform the act
- I is intention to perform the act
- P is physiological arousal
- F is facilitating conditions
- w_H and w_I are weights

Habit reflects automatic behavioral tendencies in which stimuli elicits an act without the individual consciously instructing one's self to perform it. Intention, on the other hand, reflects a conscious self-instruction to perform an act. Physiological arousal reflects the alignment between the individual's values or interests and the cues or stimuli physically present in the behavioral setting. In other words, it reflects how personally relevant the individual finds the information around him or her to be. The facilitating conditions concept reflects the objective factors "out there" in the behavioral setting, external to the individual, that make acts easy or hard to carry out. In other words, it reflects the magnitude of effort or expenditure required to perform an act. It's important to note that the individual's perceived level of ease or difficulty associated with an act is a separate concept that should not be used to measure the facilitating conditions concept (Triandis, 1980). Intention is theorized to derive from several factors which are described in the second equation below.

$$I = w_S S + w_A A + w_C C \tag{2}$$

The notation in this equation is described below.

- I is intention to perform the act
- S is social factors
- A is affect towards the act
- C is the value of the perceived consequences of the act
- w_S, w_A, and w_C are weights

The social factors concept reflects the individual's internalization of the norms, roles, and values of the culture he or she is embedded in. It equals the individual's self-instruction to perform an act based on the summation of what is viewed as correct or appropriate according to the individual's moral

code and agreements or interactions with others. Affect reflects the individual's emotional response to the thought of performing an act. The value of perceived consequences concept reflects the summation of the individual's judgments about probable consequences and the value of those consequences. In other words, it reflects the individual's expectations in terms of future outcomes and the utility associated with those outcomes (Triandis, 1980). The value of perceived consequences can be more precisely described using the third equation below.

$$C \propto \sum_{i=1}^{n} (P_{ci} \times V_{ci}) \quad (3)$$

The notation in this equation is described below.

- P_{ci} is the perceived probability that the act will have the consequence i
- V_{ci} is the perceived value of the consequence i
- The sigma symbol indicates that the each product of P_{ci} and V_{ci} is summed when there are multiple potential consequences the individual associates with an act

The TIB is a highly generalize-able theory that was not developed to explain any particular group of behavior. It's also a very comprehensive theory that accounts for many of the determinants of behavior that have been widely researched in academia. It draws on a diverse range of motivational approaches by including cognitive, affective, and behavioral concepts. A very unique characteristic of the TIB is the fact that it includes a concept (facilitating conditions) that is external to the individual and another concept (physiological arousal) that is an internal response to the external setting. These two concepts are usually ignored in the PEB literature. But the theory as a whole is gaining popularity in a sect of PEB research that's aimed at explaining transportation mode choice due to the known importance of

habitual behavior in that field (Bamberg & Schmidt, 2003; Verplanken, Aarts, van Knippenberg, & Moonen, 1998). A schematic diagram of the TIB is presented below for visual learners.

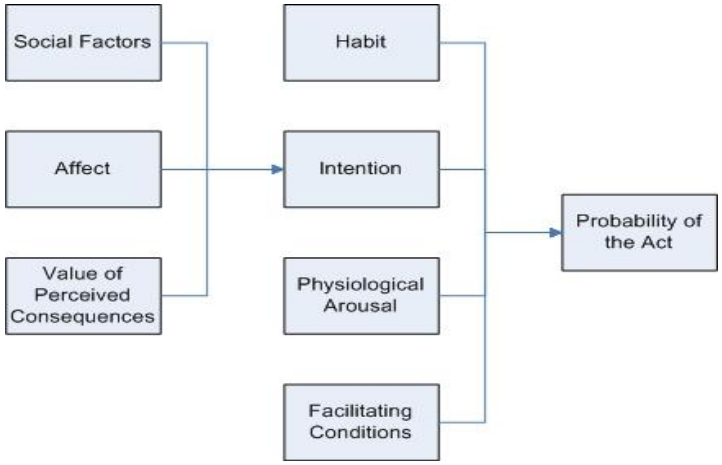

Figure 2. A schematic diagram of the Theory of Interpersonal Behavior (TIB)

Theory of Planned Behavior

The Theory of Planned Behavior (TPB) is an extension of the Theory of Reasoned Action (Fishbein & Ajzen, 1975); which was developed to explain behavior that is deliberate and volitional. Hence, it is assumed that the respondent considers the consequences of a behavior and his or her ability to act is not significantly restrained by external forces such as an actual—not perceived—lack of availability of a product (Staats, 2003). As a result, behavioral intention is theorized to be the only immediate antecedent directly affecting actual behavior. Intent is *predicted* by the individual's 1) attitude towards the behavior 2) subjective norms and 3) perceived behavioral control. These three motivational concepts, in turn, are *explained* by three corresponding sets of beliefs: behavioral beliefs, normative beliefs, and control beliefs (Ajzen, 1991). Each set of beliefs is measured in terms of the

probability of a current existence or future occurrence and is weighted by a measure of magnitude (Turaga, Howarth, & Borsuk, 2010). The logic behind the two-dimensional way beliefs are measured and their respective relationships with the antecedents to intention is rooted in the expectancy-value model of attitude formation (Fishbein, 1963), which theorizes exactly what its title implies. An individual's attitude towards a behavior is based on the weighted sum of his or her expectations for future outcomes and one's valuation of those outcomes (Ajzen, 1991). The TPB can be more precisely described with four mathematical equations; the first of which is presented below.

$$B \approx BI = w_1 A + w_2 SN + w_3 PBC \qquad (4)$$

The notation in this equation is described below.

- B is actual behavior
- BI is behavioral intention
- A is attitude towards the behavior
- SN is subjective norm
- PBC is perceived behavioral control
- w_1, w_2, w_3 are weights that are empirically assessed

Behavioral intention is an indicator of how much effort an individual is willing to exert in order to perform an act. It is assumed to capture all the motivational factors that direct behavior, regardless of whether these factors are included in the model. The attitude towards the behavior concept reflects the degree to which an individual's evaluation of a behavior is positive or negative. Subjective norm reflects the degree to which a person perceives there to be social pressure to perform or not perform an act. Perceived behavioral control was originally postulated to be synonymous with

Bandura's concept of self-efficacy, which refers to the degree to which an individual has confidence in their ability to perform an act (Ajzen, 1991; Bandura, 1982). Subsequent research, however, has shown that self-efficacy and PBC explain separate, independent portions of variance within a population. This suggests that measurements of PBC should be limited to external factors of control (e.g., weather, product availability, product affordability) and should ignore internal factors of control (e.g., confidence in one's ability to choose a truly environmentally friendly product) (Biddle, 2008; Lau & Chan, 2001). PBC is the only motivational factor that is postulated to directly affect actual behavior, in addition to influencing intention (Ajzen, 1991).

Before the next three equations are presented, it's important to note that Ajzen and Fishbein have very clearly and very precisely defined how to properly apply their theory. The two most important rules or "conditions for application" are salience and correspondence (Staats, 2003). First, researchers must elicit salient beliefs for each motivational concept from a sample of respondents that are representative of the research population. Intuitively select belief statements will not necessarily correlate with motivational factors because people can only attend to a small number of beliefs at any given moment (Ajzen, 1991). Second, all concepts within the model should be formulated at the same level of specificity and granularity. Correspondence must exist across four criteria: action, target, context, and time. Action is the behavior under investigation (e.g., purchasing), target is the object or objects involved (e.g., energy star certified laptops), context is

related to place and roles (e.g., for home or business use, at Best Buy or Walmart), and time specifies the temporal range of investigation (e.g., next week, next year) (Staats, 2003).

Even though the three subsequent equations all follow the same logic, each antecedent to intention has its own equation because the variables (i.e., concepts) differ among them. Still, in all three equations, 'n' is the total number of salient beliefs. The equation for the attitude towards behavior concept is presented first.

$$A \propto \sum_{i=1}^{n} b_i e_i \tag{5}$$

The notation in this equation is described below.

- A is attitude towards behavior
- b_i is the strength of a behavioral belief, meaning the probability an outcome will occur
- e_i is the evaluation of the belief's attribute, meaning the magnitude of value one associates with an outcome
- The sigma symbol indicates that the each product of 'b_i' and 'e_i' is summed when there are multiple potential outcomes the individual associates with an act

$$SN \propto \sum_{i=1}^{n} n_i m_i \tag{6}$$

The notation in this equation is described below.

- SN is subjective norm
- n_i is the strength of a normative belief, meaning the probability that a reference individual or group approves or disapproves of performing an act
- m_i is the motivation to comply with a salient reference individual or group
- The sigma symbol indicates that the each product of 'n_i' and 'm_i' is summed when there are multiple potential outcomes the individual associates with an act

$$PBC \propto \sum_{i=1}^{n} c_i p_i \quad (7)$$

The notation in this equation is described below.

- PBC is perceived behavioral control
- c_i is the strength of a control belief, meaning the probability that a control factor either assists or impedes an individual's ability to perform an act
- p_i is the power of the control factor, meaning the degree to which a factor makes it easy or difficult for the individual to perform an act
- The sigma symbol indicates that the each product of 'c_i' and 'p_i' is summed when there are multiple potential outcomes the individual associates with an act

Overall, the TPB theorizes behavior is a function of motivational factors that are purely derived from a cognitive process which starts with beliefs about the probability of situations and the magnitude of value or importance associated with situational attributes. As the title of the theory implies, behavior is assumed to be the result of a calculated decision that's based on self-interest reasoning and made after thoughtful consideration of motivational factors. In other words, behavior is strategic and people think about the risks and opportunities before taking action. The TPB is less comprehensive than the TIB; but it's more simplistic and still highly generalize-able. It has been extensively applied to a variety of behavioral domains, including PEB (Armitage & Conner, 2001; Staats, 2003). A schematic diagram of the TPB is presented below.

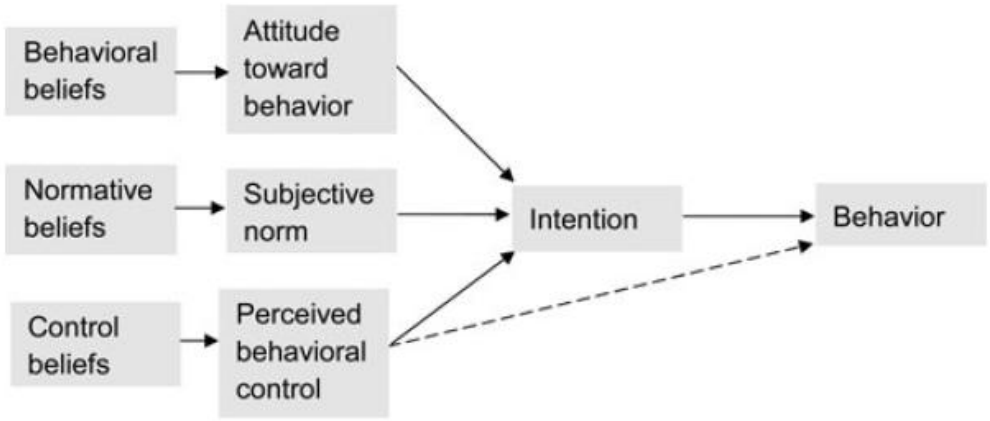

Figure 3. A schematic diagram of the Theory of Planned Behavior (TPB)

Protection Motivation Theory

Protection Motivation Theory (PMT) was originally postulated by Ronald Rogers in 1975 to address ambiguity within the health behavior research on fear appeals. At the time, there was a need to delineate many of variables being used across empirical studies in order to differentiate them from one another. There was also a need to clarify how the relationships between variables were being conceptualized. Rogers, drawing heavily on research conducted by Hovland, Janis, and Leventhal throughout the 1950s and 60s, integrated empirically supported variables and 'post-hoc descriptive schemas' into a explanatory framework he called PMT (Norman, Boer, & Seydel, 2005; Rogers, 1975).

PMT was revised in 1983 in an attempt to make it more accurate and generalize-able. It was expanded to include a broader range of stimulus factors that initiate the cognitive process and a wider range of mediating factors that influence protection motivation (Norman et al., 2005). Protection motivation is conceptualized as an intervening variable that arouses,

sustains, and directs activity (Rogers, 1975). This is very similar to the concept of intent used in TIB and TPB, except that PMT assumes that respondents are currently engaging in behavior that creates a personal threat and the behavior under investigation would effectively protect the respondent from harm (i.e., reduce the risk or impact of the threat). The assumption that a threat already exists may explain why this model has recently become attractive to scientists conducting research on climate change adaptation (e.g., Grothmann & Patt, 2005). PMT also assumes that protection motivation is determined by cognitive appraisals, as opposed to affective emotions like fear, which are not necessarily linked to conscious beliefs.

No equation has been formally adopted for PMT but, in short, it states that the persuasive impact of stimuli on protection motivation is mediated by a threat appraisal and a coping appraisal. The former is based on an individual's perceptions of 1) the severity of the threat and 2) their vulnerability to the threat. The later is based on an individual's perceptions of 1) the response efficacy of an act and 2) their self-efficacy for performing an act. Response efficacy reflects the belief that an act will be effective in reducing the threat, while self-efficacy reflects the belief that one is capable of performing an act (Rogers, 1975).

Revised PMT adds two mediating concepts: 1) the rewards of a maladaptive response and 2) the costs of an adaptive response. Maladaptive responses refer to avoidance behavior, denial of threat, and wishful thinking. It's theorized that the original four concepts have a positive effect on protection motivation, while the two newer concepts have a negative effect on

protection motivation. None of the concepts are assumed to have more explanatory power than another. PMT was originally postulated to be a multiplicative function. But due to a lack of supportive evidence, revised PMT is posited as an additive function (Norman et al., 2005).

The two new concepts in revised PMT have been widely criticized. Empiricists have pointed out that there is a lack of conceptual distinction between the 'rewards of a maladaptive response' and the 'costs of an adaptive response' (Norman et al., 2005). For example, expecting to feel calm as a result of smoking cigarettes in the future is basically the same thing as expecting to feel agitated as a result of not smoking cigarettes in the future. In other words, the cost of one behavior will often be the benefit of the opposite behavior. Meanwhile, the fringe benefits of an adaptive behavior, separate from the ability of the act to reduce the primary threat, are unaccounted for in PMT. Expecting to have better smelling breath as the result of not smoking, for example, is a side benefit that's very different from response efficacy, which is the act's ability to prevent cancer. Hence, the 'rewards of a maladaptive response' concept should be replaced with an 'adaptive response benefits' concept. After taking into account the improvement opportunity just discussed, a schematic diagram of PMT is presented below.

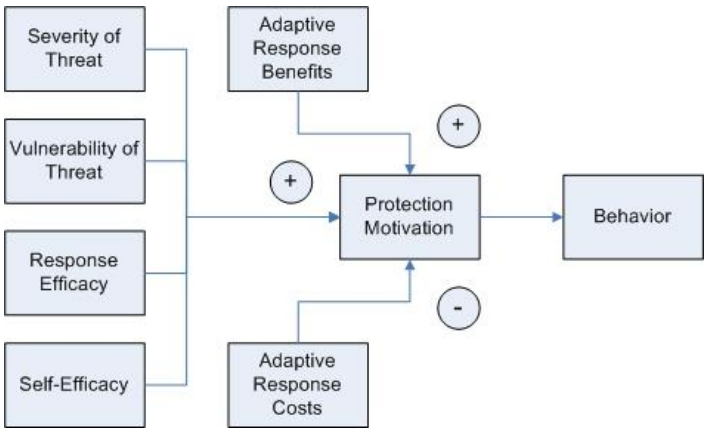

Figure 4. A schematic diagram of Protection Motivation Theory (PMT)

Norm Activation Theory

Norm Activation Theory (NAT) was originally postulated by Shalom Schwartz (Schwartz, 1973, 1977) to explain altruistic (i.e., helping, pro-social) behavior such as volunteering one's time or donating one's blood or bone marrow. As the title of the theory implies, it focuses on the conditions that elicit or affect the activation of personal norms. The concept of a personal norm is theorized to be experienced and recognized by the individual as a feeling of moral obligation. The term "norm" is used to emphasize that NAT focuses on behavioral expectations that are learned from the social interaction history of a person and thus derived from socially shared expectations. The "personal" descriptor is used to emphasize that NAT focuses on behavioral expectations that people hold for themselves and the sanctions attached to these self-expectations are tied to the self-concept (Schwartz, 1973). Hence, behavior is postulated to be motivated by a drive to act in ways that are consistent with one's values, ideals, and morals so that one can reinforce his or her sense of self-worth and avoid self-concept distress. More specifically, the motivation behind behavior is postulated to be

a process in which the "anticipation of or actual conformity to a self-expectation results in pride, enhanced self-esteem, security, and other favorable self-evaluations", while "violation or its anticipation produce guilt, self-deprecation, loss of self-esteem, or other negative self-evaluations" (Schwartz, 1977 pp. 231).

Schwartz wrote NAT in the form of a narrative and never presented any equations or schematic diagrams so the exact concepts within it and the relationships between them are a little more open to interpretation than the other major social-psychological theories examined in this study. The following interpretation is my attempt to synthesize his chapter (approximately 60 pages) in the 1977 publication of *Advances in Experimental Social Psychology*. In short, NAT states that altruistic behavior can be explained by a non-linear, three stage cognitive process that consists of 1) norm construction 2) norm activation and 3) norm neutralization. Personal norm construction is described as a "speculative analysis" in which one's anticipated behavioral outcomes are compared to one's ideal behavioral outcomes that are defined by the values he or she has internalized in the past (Schwartz, 1977). Hence, individuals who hold altruistic values are more likely to construct a personal norm for an altruistic behavior.

A feeling of moral obligation could be generated in response to new information that causes one to conduct a new speculative analysis or it could be generated as a result of a previously constructed personal norm being activated. Norm activation is described as the process by which a sufficient amount of attention is directed towards a norm to bring it into the stream of

information processing. Schwartz proposes that the initial activation of a personal norm depends on the following four concepts (Schwartz, 1977):

1. Awareness of consequences - the degree to which an individual believes that a person is in a state of need
    a. The likelihood of a threat
    b. The seriousness of a threat
2. Ascription of responsibility – the degree to which an individual believes his or her involvement is justified
    a. Being partly responsible for creating the threat (i.e., causality)
    b. Being partly responsible for responding to the need
3. Response efficacy – the degree to which an individual believes an action can relieve the need
4. Self-efficacy – the degree to which an individual believes he or she has the ability to provide relief

Drawing on neutralization theory (see Biddle, 2008 for a review), the third stage in NAT suggests an individual may employ various defense mechanisms to deactivate (i.e., neutralize) a personal norm after the initial activation (Schwartz, 1977). In my view, however, these defense mechanisms do not create any new concepts because they all pertain to denial of one of the four aforementioned antecedents to the personal norm concept. Hence, if an individual has employed denial, it will manifest in low scores on the four concepts in the activation stage. Thus, new concepts do not need to be added to capture the existence of denial.

NAT also states that the decision to employ denial is based on an individual's assessment of the personal costs and benefits of a particular response. For example, if the costs of donating blood (e.g., pain, time) are perceived as greater than the benefits (e.g., recognition) of donating blood, then that person is likely to employ denial to avoid negative sanctions (e.g., negative self-evaluations) (Schwartz, 1977). Alternatively, if the benefits are

perceived as greater than the costs, then the person is likely to comply with his or her personal norm in pursuit of positive sanctions (e.g., positive self-evaluations). Since this appraisal is theorized to reflect the likelihood that a person will employ denial and neutralize his or her personal norm, I argue that these perceptions can explain part of the variance in behavior that the initial feelings of moral obligation cannot account for.

The last factor that Schwartz describes is something he calls "the boomerang effect", which offers an explanation for some of the empirical surprises he found when conducting research on early iterations of NAT. Schwartz found that when the information presented to people described an extremely desperate situation, people who scored high in the 'awareness of consequences' concept went from the most likely people to volunteer to the least likely people to volunteer. In consequence, NAT theorizes that altruistic behavior is sensitive to perceptions of exploitation. This concept can manifest in several different ways. It may pertain to a suspicion that the need is presented for ulterior motives like gaining access to resources; a lack of trust in the entity soliciting help to accurately portray the need; skepticism about the lack of control a person in need has in the situation; or all the above (Schwartz, 1977). A schematic diagram of NAT is presented below to summarize the theory as it was just described.

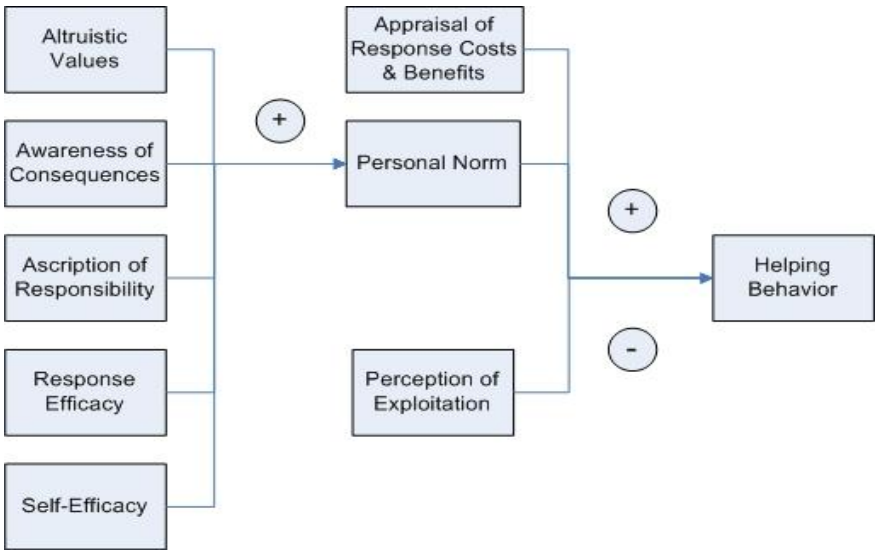

Figure 5. A schematic diagram for Norm Activation Theory (NAT)

Value-Belief-Norm Theory

The Value-Belief-Norm Theory of Environmentalism (VBN) was postulated by Paul Stern and his colleagues to explain behavior that supports a social movement, especially PEB (Stern, Dietz, Abel, Guagnano, & Kalof, 1999; Stern, 2000). In consequence, it is the only theory being examined in this study that was actually intended to explain PEB. It is also the most recent theory being examined in this study. VBN draws heavily on the work of Shalom Schwartz and one could argue it's a heavily modified version of NAT, rather than a completely new theory.

VBN consists of seven concepts that can be classified as a value, belief, or norm. The seven concepts are biospheric values, altruistic values, egoistic values, the new ecological paradigm, awareness of consequences, ascription of responsibility, and personal norm. VBN links these concepts in a casual chain that moves from beliefs that are relatively stable and highly generalized to beliefs that are volatile and specific to the behavior at hand (Stern, 2000).

The three values concepts are rooted in Schwartz's research on universal value types. Schwartz's research supports the notion that all humans have a universal set of values. It also defines the different types of values within this set and clarifies the structure of universal values (i.e., the relationships among them) (Schwartz, 1994). The findings are summarized in the pie chart below. VBN separates the items within Schwartz's self-transcendence high order value type into two concepts: altruistic values and biospheric values. Altruistic values reflect trans-situational goals for helping other people, while biospheric values reflect trans-situational goals for helping nature or the environment. Egoistic values are synonymous with Schwartz's self-enhancement high order value type that reflects trans-situational goals for power, wealth, and authority.

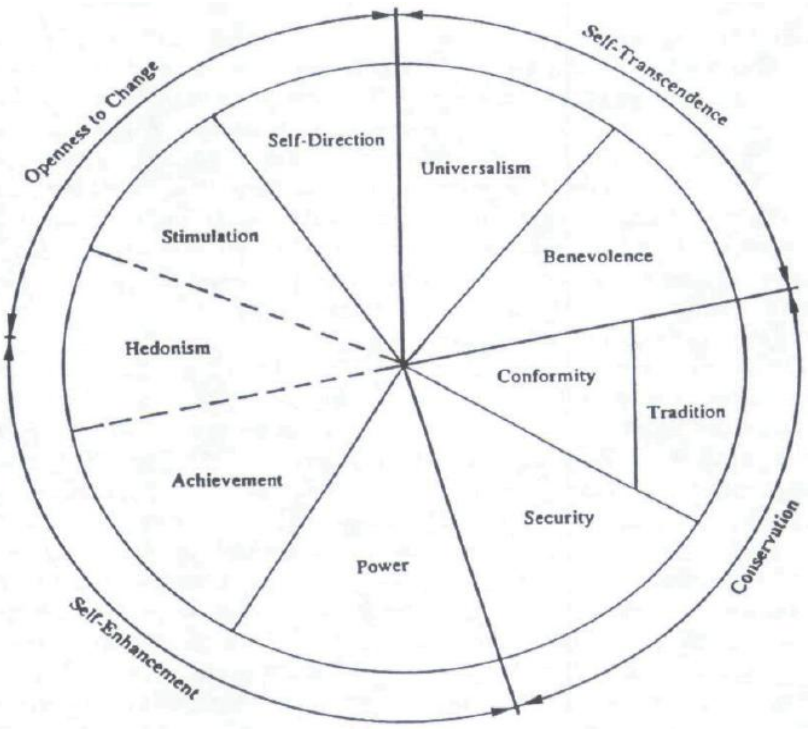

Figure 6. A schematic diagram of the Schwartz Value System

The new ecological paradigm (NEP) is a scale developed by Dunlap and his colleagues that evaluates an individual's beliefs about the relationship between humans and nature (Dunlap, Van Liere, Mertig, & Jones, 2000). VBN utilizes a shortened version of the scale that is meant to reflect the degree to which a person has a worldview in which human actions have substantial adverse effects on a fragile biosphere. VBN postulates that individuals who hold the NEP worldview are predisposed to accepting beliefs within the awareness of consequences concept that are more narrowly focused (Stern et al., 1999). See the Norm Activation Theory section above for a description of the following concepts borrowed from NAT: awareness of consequences, ascription of responsibility, and personal norm.

VBN states that four different groups of PEB are explained by VBN theory but specifies that each group of PEB should be analyzed separately because the explanatory power of each behavioral determinant is likely to vary across different groups of PEB. This view deviates away from the majority of PEB research because empiricists have tended to use behavioral scales such as the General Ecological Behavior (GEB) scale (Kaiser & Wilson, 2004) that include a diverse range of PEB.

The groups of PEB proposed by VBN are 1) activism 2) non-activist public-sphere behavior 3) private sphere behavior and 4) behavior in organizations. Activism includes active participation in environmental organizations, demonstrations, and protests. Non-activist public-sphere behavior includes writing letters to political officials, making donations to environmental organizations, and supporting stricter environmental

regulations or public policies. Private-sphere behavior includes the purchase, use, and disposal of personal or household products. Behavior in organizations refers to actions taken by an individual on behalf of an organization (e.g., corporation, NGO) that influences the environmental impact of its operations (Stern, 2000). Thus, although VBN is more focused on PEB than the other theories, it's still highly generalize-able due to the wide range of behaviors that can be considered PEB. A schematic diagram of VBN is provided below.

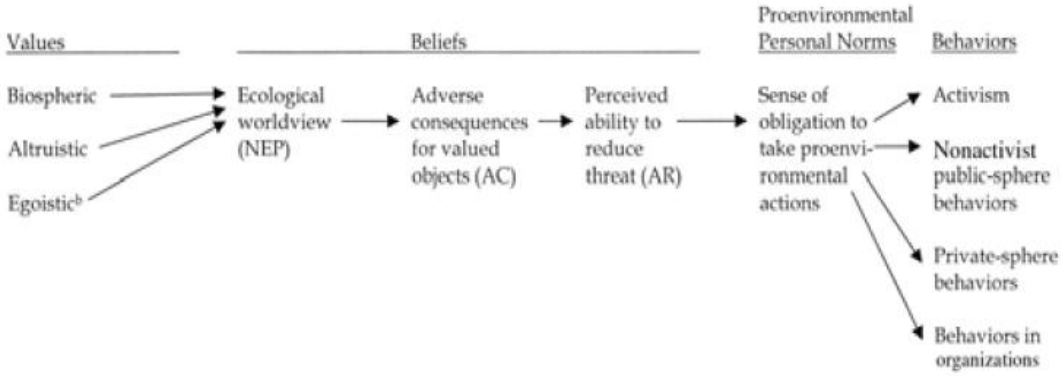

Figure 7. A schematic diagram of Value-Belief-Norm Theory (VBN)

Summary

The five competing theories reviewed above are quite different when you look at the full set of concepts and relationships that are present in each one. An in-depth review and holistic interpretation of NAT, for example, shows that NAT and VBN are not near as similar one would expect—despite the fact that VBN is supposed to be grounded in NAT.

When you look past the terminology differences and dig into at the definitions of specific concepts, however, more similarities emerge than one would expect from competing theories. All the theories except for VBN, for

example, posit that behavior is influenced by some kind of appraisal of costs and benefits. In fact, the 'value of perceived consequences' construct in the TIB is exactly the same as the 'attitudes toward behavior' construct in the TPB. Despite the similarities, it should be noted that PMT conceptualizes costs and benefits as two different concepts, whereas the other three theories conceptualize it as one, simultaneous evaluation of positive and negative expectations.

The TPB and the TIB both came out of the University of Illinois so their similarities are not totally surprising. In addition to both of them including an appraisal of costs and benefits, the 'facilitating conditions' concept in the TIB is conceptually equivalent to the 'perceived behavioral control' construct in the TPB. Plus, the subjective norms construct in the TPB is one of the variables within the social factors concept in TIB. Although the authors of the TIB and the TPB seemed to view their respective theories as being in fierce competition with one other in the 1970s, it's their commonalities that are apparent today.

But the thing that's even more striking is how their respective strengths and weaknesses make them ripe for integration. One of the strengths of the TPB is that it is much more precise about how to measure its concepts. The TIB, on the other hand, is a much more comprehensive theory. The TIB accounts for the influence that emotion (i.e., affect) has on intention and it accounts for the influences that habit and physiological arousal (i.e., attention) have on behavior. I surmise that a substantial increase in

explanatory power could be yielded from further integration of these two theories.

PMT and NAT display a few striking resemblances too. They share several concepts; despite the fact that that NAT was designed to explain altruistic behavior and PMT was designed to explain behavior that only affects an individual's personal health. Both theories incorporate Bandura's (1982) concepts of self efficacy and response efficacy. And both theories address beliefs about negative future consequences or threats. PMT states behavior is driven (in part) by an individual's perception of the severity of a threat and their vulnerability to it, while NAT refers to beliefs about the likelihood and seriousness of a threat. It's also important to note that the definitions of severity and vulnerability, as compared to the TPB's definitions of probability and magnitude of value, are practically the same. The only difference is that these two variables stand alone as separate concepts in PMT, while in the TPB these two variables are multiplied to measure the constructs pertaining to beliefs. Thus, there seems to be a high degree of agreement and convergence on the specific kinds of beliefs and expectations that drive behavior.

Chapter 5

IMPORTING THEORY: HOW WELL DOES THE FOREIGN THEORY FIT?

Now that I have reviewed some of the most prominent behavioral theories in social psychology, I will turn my attention to which theories have been applied to empirical studies of GPB and how appropriate it is to do so. Although the TIP and PMT have been applied to PEB research, no empirical studies of GPB were found in this literature review. In consequence, it is assumed that TIP and PMT are rarely applied to GPB and further examination is limited to the TPB, NAT, & VBN.

Amundson (1998) proposed a list of criteria that could be used by researchers to evaluate how appropriate it is to import a theory from another field to address a local research question. Three out of the four criteria are used to qualitatively assess how appropriate it is to apply each social-psychological theory to GPB (Amundson, 1998). These three criteria are presented in table three below.

Table 3

Criteria for Importing Foreign Theory

Criteria	Questions
Match of phenomenon	How well does the phenomenon studied in the imported theory align with the characteristics of GPB? Is there a logical argument for why the previously studied phenomenon is similar to GPB?
Match of concepts	How well do the concepts in the imported theory align with the concepts commonly used to explain GPB? Is there a logical argument for why they are similar?

Match of underlying assumptions	How well do the underlying assumptions in the imported theory align with the underlying assumptions commonly present in explanatory theories of GPB? Is there a logical argument for why they are similar?

Since there's no GPB field or any purely local GPB theories, proxies must be selected to serve as the local concepts and underlying assumptions in GPB research. In consequence, each social-psychological theory is compared to four common assumptions underlying purchasing theories, three characteristics of PEB, and five common groups of interpersonal concepts used to explain PEB. The common assumptions presented in table four below were adapted from Jackson's review of theoretical approaches to consumption and purchasing behavior (Jackson, 2005).

Table 4

Common Assumptions Made in Purchasing Theory

Assumption	Definition
Self-interest Consumption	Consumers purchase goods to maximize their own well being.
Evolutionary Consumption	Consumers purchase goods to court the opposite sex and reproduce.
Ordinary Consumption	Consumers purchase goods to maintain normalcy and routine.
Symbolic Consumption	Consumers purchase goods to construct and communicate their personal identity.

The common groups of concepts used in this analysis were adapted from the 'levels of causality' framework proposed by Gardner and Stern. In this framework, level five has the most *indirect* influence on PEB, while level

one is postulated to have the most *direct* affect on PEB (Gardner & Stern, 1996). Although norms were excluded from the original 'levels of causality' framework, they are grouped with attitudes in table five below because both concepts emphasize evaluative information processing and decision making (Schwartz, 1977; Staats, 2003).

Table 5

Concepts Commonly Used in PEB Theory

Level of Causality	Concepts
5	Values and worldviews
4	Beliefs and expectations
3	Attitudes and norms
2	Knowledge
1	Attention and recollection

The concepts are grouped together in table five to facilitate a manageable theoretical assessment. But each individual concept in the framework is defined in table six below to help elucidate the rationale behind concept groupings and the distinction between different levels of causality.

Table 6

Definitions of Concepts Commonly Used in PEB Theory

Concept	Definition	Examples of constructs
Values	Desirable goals, varying in importance, that transcend specific situations and serve as guiding principles in the life and actions of a person (Schwartz, 1994).	1. self-transcendence 2. self-enhancement 3. tradition 4. openness to change

Worldviews	Primitive beliefs that represent one's basic truths about reality and influence a wide range of more specific beliefs (Dunlap et al., 2000).	1. new ecological paradigm 2. locus of control
Beliefs	A judgment on the truth or validity of a specific statement that often helps one define a category of reality or a relationship between categories (Triandis, 1980).	1. appraisals on the probability that a current state exists or a relationship between two or more variables is valid 2. appraisals on the magnitude of value, utility, desirability, or favorability associated with a current state or relationship
Expectations	A judgment on the truth or validity of a specific statement about the relationship between an act or event and a future outcome that will occur as a result (Jansson-Boyd, 2010a).	1. appraisals on the probability that a future outcome will occur if an action is taken 2. appraisals on the magnitude of value, utility, desirability, or favorability associated with a future outcome
Attitudes	Positive or negative evaluations of people, objects, acts, or ideas. These evaluations can be based on facts, beliefs, emotions, and/or observed behavior (Jansson-Boyd, 2010b).	1. appraisals on the magnitude of emotion like joy or pleasure associated with a particular act 2. appraisals on the magnitude of goodness or badness associated with a particular act
Norms	Self-instructions to do what is perceived to be correct and appropriate by members of a culture in certain situations (Triandis, 1980).	1. injunctive norms like a feeling of obligation to buy green products because other people think you should 2. descriptive norms like a feeling of obligation to buy green products because that's what other people do

Knowledge	A judgment on the truth or validity of a specific statement to which there is a correct answer that either demonstrates an understanding of meaning, causes, or effects; or a competence in how to take action (Frick, Kaiser, & Wilson, 2004; Roser-renouf & Nisbet, 2008).	1. declarative (i.e., factual) knowledge like knowing the clothes dryer uses the most energy in laundry process 2. procedural knowledge like knowing how to dry clothes without using a dryer
Attention and recollection	A process in which information stored in sensory memory is noticed or recognized and concentrated on until it's passed on to short-term memory (Jansson-Boyd, 2010c).	1. the frequency one remembers to look for a green product or attribute while shopping 2. the frequency one sees a green product or sees signage for a green product while shopping

Match of Phenomenon

Staats (2003) explains how PEB often comes hand in hand with three dilemmas: a social dilemma, temporal dilemma, and spatial dilemma. First, manifestations of PEB can often be characterized as a social dilemma, meaning individual interests and collective interests are at odds (Staats, 2003). The presence of a social dilemma can have a major impact on cognitive processes.

For one, if a product is presented as environmentally responsible, then consumers will likely consider a larger and more diverse set of consequences than usual when making their purchase decision. The set of considerations for a green product is likely to include more collective environmental interests than a typical product. But it would be foolish to assume individual interests are ignored. Hence, researchers may need to measure both individual and collective interest in order to create an accurate model. I

would even argue they should be measured as separate constructs because some respondents are likely to put more weight on collective interests than others.

Two, beliefs about expectations of future outcomes may be based on beliefs about descriptive social norms, collective self-efficacy, and collective response efficacy; rather than just individual response efficacy (Staats, 2003). In other words, an individual's beliefs about the likelihood of a future outcome may depend on their perceptions of how other people behave, what their capabilities are, and how effective collective action would be. Lastly, social dilemmas may bring a moral judgment of fairness into consciousness; in which case people would have to evaluate whether their self-concept expects them to be part of the cooperative group or the group of free riders (Staats, 2003). I argue this tendency should be conceptualized as a value or worldview and measured as such (e.g., "as a guiding principle in my life, I believe…") (Schwartz, 1994).

PEB is often associated with temporal or spatial dilemmas as well; meaning the collective interests may not be compromised for several years or may primarily affect distant geographic areas (Staats, 2003). As a result, the when and where of consequences could have a big influence on how consumers respond to stimuli, regardless of whether that stimuli is in a store or on a survey instrument. Hence, in order to create accurate models, researchers may need to specify the time and place of current or future environmental problems and human threats. To further complicate things, potential environmental problems are frequently surrounded by relatively

high uncertainty about when and how the problems will manifest. In consequence, it may be extremely difficult for researchers to objectively select a time and place for environmental problems based on facts. As an alternative, researchers may want to select times and places that their respondents are most likely to find personally relevant.

The TPB is the closest fit, as shown in the table below, because of its measurement principles. The TPB's measurement principles emphasize salience and correspondence. Salience refers to eliciting the issues, attributes, or behavioral consequences that are top of mind in the research population. Correspondence refers to using a standardized level of specificity and granularity in all the questions and belief statements (Staats, 2003). Although the salience principle does not explicitly direct researchers to elicit both collective and individual interests, it does give both types of interests an equal opportunity to emerge. The correspondence principle, in contrast, does explicitly recommend that researchers pay close attention to the temporal and spatial aspects of their questionnaire items. Thus, the TPB explicitly addresses two out of three dilemmas commonly associated with PEB and the TPB's measurement principles may cause researchers to unintentionally address the social dilemma.

Table 7

Match of Phenomenon Results

Characteristics of PEB	TPB	NAT	VBN
Social Dilemma	N	N	N
Temporal Dilemma	Y	N	N
Spatial Dilemma	Y	N	N

NAT and VBN, on the other hand, do not provide any measurement guidelines that address the three dilemmas of PEB. Since the concepts closest to behavior in both theories were originally developed to examine helping behavior, the constructs in empirical studies are likely to emphasize collective interests; while individual interests may be completely ignored. Further, the responses to constructs may be biased or unreliable across a sample because researchers didn't specify the time and place of environmental problems, they vary across constructs, or they vary within items for a single construct. The constructs measuring values, because of their trans-situational nature, should not be negatively affected by the lack of measurement guidelines. But since the majority of constructs within NAT and VBN are negatively affected, this could be considered a major drawback to applying them to GPB or any other type of PEB.

Match of Concepts

As shown in table eight below, all three theories measure levels three and four in the levels of causality framework for PEB. The TPB covers these two levels in the most comprehensive manner because it's the only theory

that directly measures attitudes. VBN's coverage, on the other hand, is the least comprehensive because it only measures beliefs and personal norms.

Only NAT and VBN measure level five. VBN includes three constructs that measure different types of values and a worldviews construct that measures a one-dimensional conceptualization of the New Ecological Paradigm (Dunlap et al., 2000; Stern et al., 1999). NAT includes altruistic values but worldviews are not included.

Table 8

Match of Concepts Results

LoC	Concepts	TPB	NAT	VBN
5	Values and worldviews	N	Y[1]	Y
4	Beliefs and expectations	Y	Y	Y
3	Attitudes and norms	Y	Y	Y
2	Knowledge	N	N	N
1	Attention	N	N	N

Knowledge is not addressed in any of the theories examined here. Although some researchers have noted that knowledge is difficult to measure (Martin & Simintiras, 1995), it's not impossible to measure. Procedural knowledge (Frick et al., 2004) of GPB, for example, could be measured by asking respondents to select the correct image of an eco-label in a set that also includes three fake images. Similarly, respondents could be asked to identify the fake green brand in a group of real green brands. It's important to note that the objective nature of these measures make them very different from self-reported measures of perceived knowledge that are conceptually

[1] Although a values concept is included in the original theory, it's commonly ignored in empirical studies

closer to concepts such as self-efficacy and perceived behavioral control. Objective measures of knowledge are clearly absent from all three theories.

Attention is also ignored in all three theories. None of the theories directly measure the presence, likelihood, or magnitude of attention given to green products in the action situation (e.g., shopping at a retail store or on a retail website). I surmise that attention is ignored because it is a hard concept to measure. But again, it's not impossible and the required technology is becoming increasingly accessible (Ohme, Matukin, & Pacula-lesniak, 2011). Click mapping (i.e., heat mapping) is one of the easiest ways to measure attention. It involves asking respondents to click the sections of an image that they find to be most interesting and then visually reporting the sections that were most frequently clicked by a group of respondents as red hot spots. Although click mapping does not seem to be popular within academic literature, survey tools such as Qualtrics are capable of collecting this type of data (Louis, n.d.). When examining GPB, researchers could measure attention by applying click mapping analytics to images of product packaging or shelving. This would enable researchers to identify respondents who are visually searching and attracted to eco-labels or other green product cues on signage or packaging.

Match of Underlying Assumptions

As shown in the table nine below, none of the theories assume that behavior is partially a function of genetic desires aimed at reproduction. Concepts that tap into an individual's perceptions of what the opposite sex thinks about buying, owning, or using an environmentally preferable product

may add predictive value to these models. The absence of concepts and relationships that address this assumption may establish an upper limit to their predictive value.

All three theories assume that people act in accordance with their own self-interest. The TPB and NAT both directly measure utilitarian considerations and postulate a positive relationship between them and behavior, while VBN only measures personal norms and assumes that they motivate behavior because conforming to them will enhance an individual's self-esteem. In other words, VBN assumes individuals seek to maximize psychological utility like self-esteem, even though it doesn't attempt to measure psychological utility. The TPB is able—but not required—to account for utilitarian considerations in its behavioral outcome beliefs (e.g., how good will it taste?) and control beliefs (e.g., how long will it take to acquire it?). NAT is also able to account for utilitarian considerations via its appraisal of response costs and benefits construct. But unlike the TPB, NAT measures personal norms as well. In consequence, NAT has the most comprehensive coverage of the self-interest assumption because it can account for both material (i.e., physical) utility and psychological utility (aka "warm glow" in economics). The TPB and VBN, on the other hand, only account for one aspect of utility.

Table 9

Match of Underlying Assumptions Results

Assumption	TPB	NAT	VBN
Self-interest Consumption	Y	Y	Y[2]
Evolutionary Consumption	N	N	N
Ordinary Consumption	Y	N	N
Symbolic Consumption	N	Y	Y

Only NAT and VBN assume that behavior is a dynamic process by which people construct, reinforce, and reevaluate an identity that they communicate to others and themselves. Although neither NAT nor VBN directly measure the alignment between an individuals' identity and the behavior in question or one's desire to communicate that identity to others, they both postulate that values influence personal norms and personal norms motivate behavior. Since personal norms reflect the behavioral expectations people have for themselves, these two relationships assume that one's values partially define their self-concept (i.e., perceived identity) and that people seek to act in ways that are consistent with this identity. In other words, the causal chain that goes from values to personal norms to behavior assumes that people have a drive to reinforce their sense of self-worth and avoid self-concept distress. None of the concepts or relationships in the TPB are posited with this assumption in mind. However, if behavioral outcomes such as feelings of guilt or pride are mentioned by respondents in the qualitative research that the authors recommend conducting prior to distributing a

[2] This classification assumes that well-being partially depends on the need for self-esteem and hence, utility may come in the form of positive self-evaluations such as pride.

survey, then the behavioral outcome beliefs construct would unintentionally address this assumption.

Only the TPB assumes that behavior is at least partially determined by motives to maintain what is familiar in terms of normalcy or stability. The TPB measures normalcy motives via the subjective norm and normative beliefs constructs, which measure and explain the presence of an injunctive social norm respectively. The TPB does not address both aspects of the assumption though. It does not account for the explanatory power of sub-conscious, semi-automatic behavioral routines (i.e., habits). In fact, the TPB has been widely criticized for assuming that every time people take action, they consciously thinks about the consequences of that act (Staats, 2003).

Summary

The three social-psychological theories examined here possess four common flaws in terms of being suitable for GPB. None of them explicitly address the assumption of evolutionary consumption or the social dilemma aspect of PEB. Similarly, none of them include concepts that measure knowledge or attention.

In alignment with purchasing theory, all three social-psychological theories assume that people act in their own self interest. But NAT is the only theory that addresses both utilitarian and psychological utility. The way that NAT and VBN address psychological utility assumes that behavior is motivated by a drive to construct a personal identity. The TPB, in contrast, ignores symbolic expression and assumes people's behavior is driven by their

attitude towards control and a self-instruction to comply with their perceptions of what other people think they should do.

Based on the levels of causality framework, NAT and VBN are slightly more comprehensive than the TPB because they include concepts pertaining to values and worldviews. But the single, most important distinguishing factor among these three social-psychological theories may be the fact that the TPB is the only theory that addresses the spatial and temporal dilemmas associated with PEB. Since neither NAT nor VBN address any of the dilemmas associated with PEB, the TPB's measurement principles may be the deciding factor that gives it the edge in terms of yielding high predictive value.

Chapter 6

RESULTS

Sample Description and Theory Attractiveness

The sampling frame was built from a snowball sampling method and consisted of 60 publications. All publications were believed to have applied at least one of the three social psychological theories to an investigation of PEB. Of these 60 publications, 21 applied the TPB, 9 applied VBN, 23 applied NAT, and 7 were found to not adequately apply any of the social-psychological theories. Of the 53 remaining publications in the sampling frame, only 21 met the criteria for inclusion in the final sample of empirical studies that examined GPB. The relative frequency of theory application in the final sample is presented in figure eight below. It's clear from this pie chart that empiricists who research GPB have applied the TPB more frequently than the other two theories by a fairly large margin.

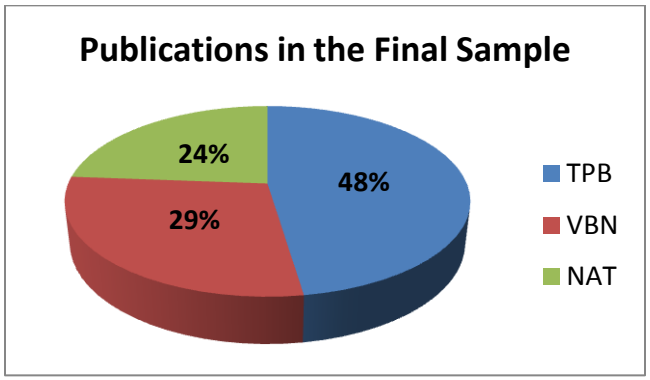

Figure 8. Publications in the final sample of empirical studies

Many publications in the final sample tested a model across multiple samples or sub-samples of human subjects. In consequence, the accuracy of empirical models is evaluated per "test", rather than per publication. The

final sample consists of 40 tests; in which 21 applied the TPB, 9 applied VBN, and 6 applied NAT. Unfortunately, only a minority of the publications within the final sample reported the r^2 values for each test at both points of interest in the model.

The Accuracy of Models

In this study, the accuracy of models is synonymous with the terms explanatory power, predictive value, and percentage of explained variance. All three terms are measured using the same metric—r^2 values. The accuracy of each model was evaluated at two different points. First, accuracy was evaluated with the intention or personal norm construct as the dependent variable. It's worth noting that the personal norm construct in NAT and VBN serves the same role as the intention construct in the TPB. Second, accuracy was evaluated with the measure of actual GPB as the dependent variable. The results of both assessments are presented in figures nine and ten below. In short, the results show that the accuracy of the three social-psychological theories is fairly similar when researchers are attempting to explain an intention to buy green products. But the TPB is clearly superior when researchers are attempting to explain actual GPB.

Upon closer examination of figure nine below, we can see that the TPB is slightly more accurate at predicting intention as well. It's hard to evaluate the accuracy of NAT at this point in the model because only one of the six tests reported an r^2 value (.46). The TPB and VBN have similar measures of central tendency hovering around .5. But there is a much larger spread among empirical studies that opted for the TPB (s = .2 ; IQR = .28) over VBN

(s = .1 ; IQR = .1). As shown below, TPB's distribution is skewed towards higher r^2 values and 25% of the observed values are greater than .67. VBN's distribution, in contrast, is skewed towards lower r^2 values and the maximum observed value is .57. Thus, the TPB has proven to be the most accurate social-psychological theory in terms of predicting a consumer's intention to buy green products.

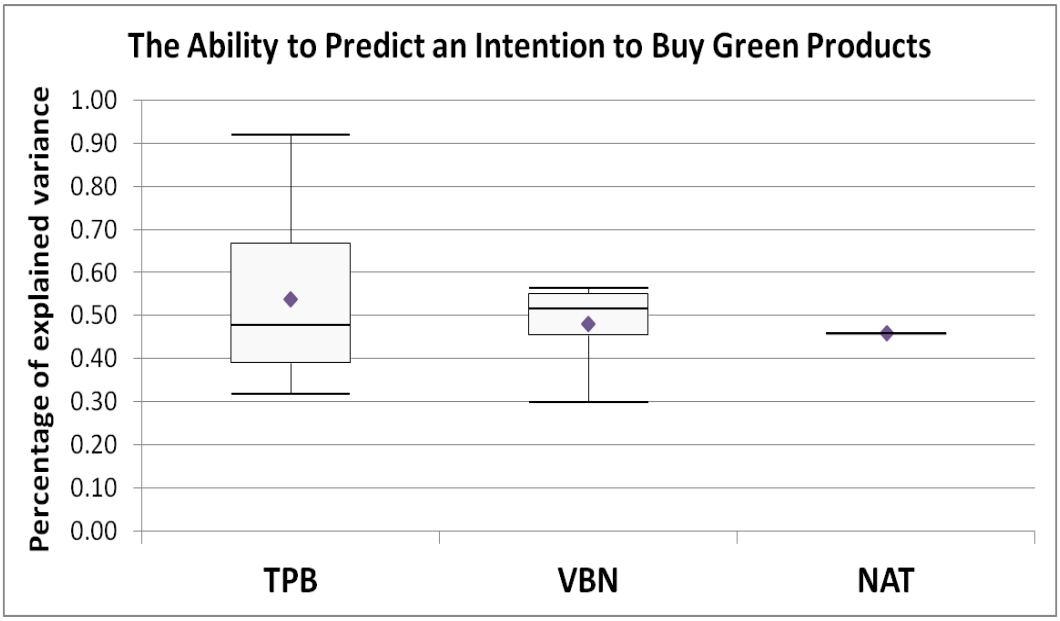

Figure 9. The ability of models to predict consumers' intention to buy green products

As figure ten demonstrates below, it's clear that the TPB is significantly more accurate at predicting a consumer's actual GPB too. First, the TPB has the highest median r^2 value at .42, followed by VBN's .24 and NAT's .19. Second, the TPB has the highest mean r^2 value at .46, followed by VBN's .26 and NAT's .15. Third, 75% of TPB's observed r^2 values are greater than .26, while 75% of the observed values for VBN and NAT are less than .29 and .20 respectfully. Thus, the TPB has proven to be the most accurate

social-psychological theory in terms of predicting a consumer's actual green purchasing behavior.

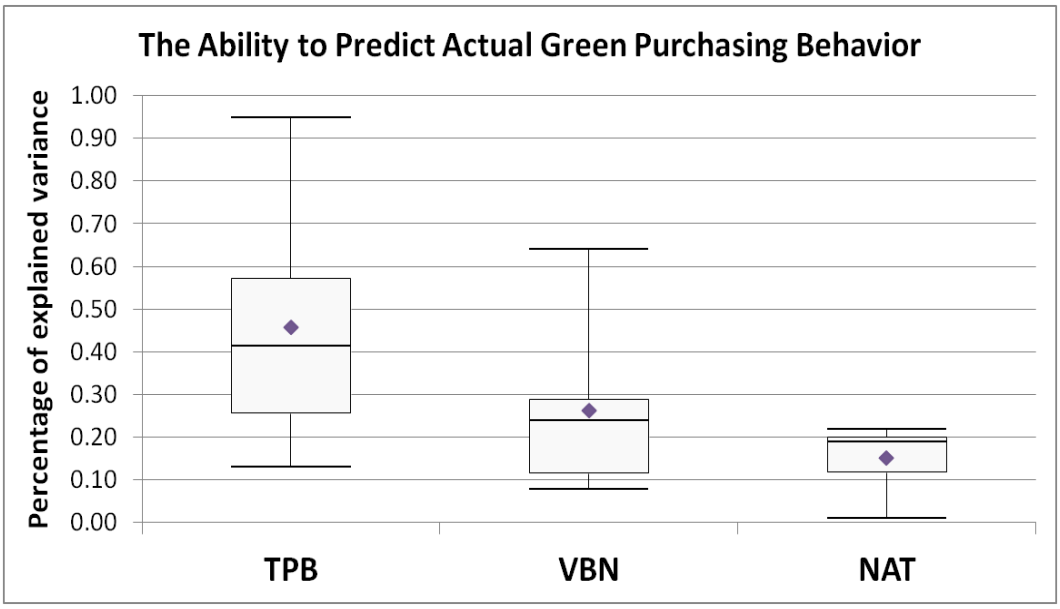

Figure 10. The ability of models to predict consumers' actual green purchasing behavior

When examining the determinants of behavioral intention, the three social-psychological theories achieve similar levels of accuracy as demonstrated by their mean values (TPB = .54, VBN = .48, NAT = .46). But the results are less clear when examining the determinants of actual GPB because the high degree of spread in the data that makes it difficult to interpret. The sample range for the TPB, for example, is .82. Since the maximum sample range is 1, the values observed for the TPB cover most of the values that are possible to observe. The sample range of VBN (.56) also includes a majority of the values that are possible to observe.

Despite these difficulties, it seems reasonable to conclude that VBN and NAT perform fairly similarly in terms of accuracy, while the TPB is in a league of its own. The mean r^2 value for the TPB (.46) is 77% bigger than the

mean r^2 value for VBN (.26). Further, there is significant overlap in the interquartile range of r^2 values for VBN (IQR = .29-.12) and NAT (IQR = .20-.12) when examining the determinants of actual GPB. In other words, 50% of the observed values for VBN lie between .12 and .29, while 50% of the observed values for NAT lie between .12 and .20. The TPB's inter-quartile range, in contrast, consists of much higher r^2 values (IQR = .57-.26), meaning 50% of the observed values lie between .26 and .57. Thus, the TPB significantly outperforms VBN and NAT in terms of its capacity to predict actual green purchasing behavior.

As previously noted, there is a high degree of spread in the data used to assess accuracy. In addition, there are significant differences between the values associated with intention versus actual GPB. More specifically, the spread in r^2 values gets significantly bigger when evaluating the ability of models to accurately predict actual GPB, as opposed to behavioral intent. VBN, for example, goes from a sample range of .27 to .56; while its inter-quartile range goes from .10 to .17. The measures of central tendency significantly decrease as well. VBN, for example, goes from a mean r^2 value of .48 to .26. These results suggest all three theories are somewhat atomistic when applied to GPB and that the intention construct alone is not sufficient for predicting actual GPB. That conclusion, in turn, suggests that researchers should turn to theories with multiple antecedents to behavior, such as Harry Triandis' TIB, when developing explanatory models of GPB in the future.

The Generalize-ability of Empirical Evidence

The TPB appears to have the strongest supporting evidence in terms of how generalize-able the conclusions reached in empirical studies are. Generalize-ability reflects how transferable the conclusions in a study are to a larger population or a group of behaviors that exist or occur in reality. Regardless of whether one is looking at the generalize-ability of human subjects or behavioral measures, the TPB appears to come out on top. As shown in figure eleven below, all three theories have a similar number of empirical studies that were judged to have either high or low generalize-ability in terms of their conclusions being generalize-able to a larger population. The number of empirical tests judged to have medium generalize-ability, in contrast, is dominated by the TPB. Collectively, empiricists have conducted 13 studies on GPB that employ the TPB and reach a medium level of generalize-ability, while the number of empirical tests that possess a medium level of generalize-ability and employ VBN or NAT are two and four, respectively.

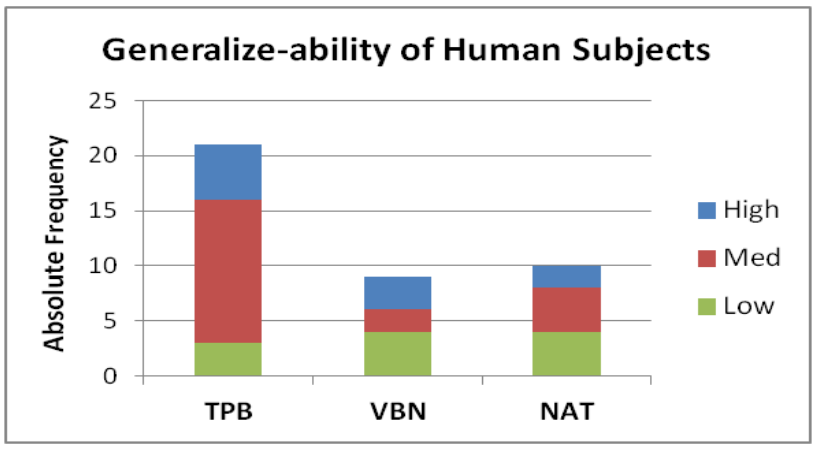

Figure 11. The generalize-ability of human subjects in empirical studies of green purchasing behavior

Similarly, the generalize-ability of the behavioral measures used within each one of these studies was evaluated. Figure twelve displays the number of empirical studies that address highly generalize-able behavioral measures (e.g., buying environmentally friendly products) versus measures that are only somewhat generalize-able (e.g., buying organic food products) and measures with little generalize-ability (e.g., buying an energy star certified laptop). It's apparent from this column chart that each theory has a similar number of empirical studies with behavioral measures that are only generalize-able to a narrow range of GPBs (TPB = 4, VBN =4, NAT = 2). The TPB, however, has a substantially larger number of empirical studies that were judged to have medium behavioral generalize-ability (TPB = 8, VBN = 0, NAT = 1). Thus, the TPB is supported by the strongest empirical evidence in terms of generalize-ability.

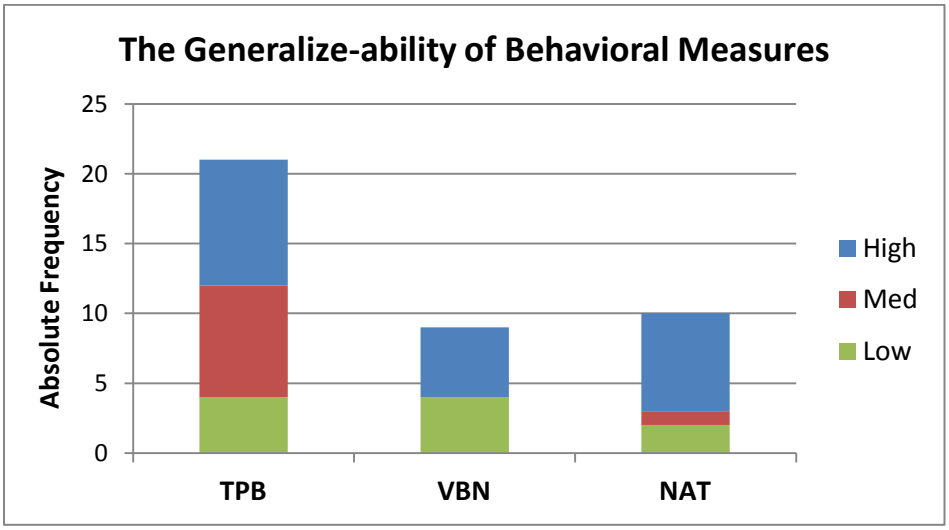

Figure 12. The generalize-ability of behavioral measures used in empirical studies of green purchasing behavior

Chapter 7

DISCUSSION

Theory Attractiveness

Since the TPB is the dominant theory in terms of the frequency of application to GPB, the evidence suggests the TPB is the most attractive theory to empiricists studying GPB. The primary reason the TPB is the most popular theory to apply may be that it's viewed as valid and precise, as opposed to holistic or particularly appropriate for GPB. The TPB, unlike NAT and VBN, is very precise because it's written using mathematical equations and schematics that don't leave much open to interpretation. Further, out of all three theories examined, Ajzen and Fishbein offer the most detailed explanation of the rationale behind their construct choices and proposed relationship structure. They also provide measurement principles and detailed guidelines on how to measure each construct. These details provide strong arguments for high concept and construct validity, while the fact that they are grounded in previous work creates high face validity. In addition, several researchers have proposed adding constructs to the TPB as opposed to simplifying the TPB or abandoning it all together. This indicates that the original set of constructs and relationships in the TPB are viewed as valid; but still insufficient for fully explaining GPB. Thus, the TPB may be the most frequently applied because it's viewed as the most valid explanatory model, not the most holistic or appropriate model.

VBN and NAT perform very similarly in terms of being attractive to empiricists. But these two theories are probably attractive to empiricists for

very different reasons. The reason NAT is fairly popular to apply may be for the exact opposite reason many empiricists choose to apply the TPB. NAT is written more like a narrative. This leaves many critical aspects, such as the operationalization of constructs and the relationships between them, open to interpretation. In fact, NAT was operationalized in several different ways throughout the sample of empirical studies that I collected for this study. Most empiricists, however, did tend to ignore many of the concepts proposed within NAT. Hence, NAT does not appear to have been selected because it is viewed as holistic or precise. Instead, it may be attractive to researchers who seek flexibility or the freedom to creatively modify a model when applying it to GPB.

VBN, on the other hand, is hypothesized to be attractive to empiricists because it was recently postulated and it integrates other well-known theories. But empiricists probably do not view VBN as a particularly valid theory. Although many of its constructs are borrowed from NAT, the proposed relationships between several of its concepts lack theoretical justifications and empirical support. One study concluded that, despite the high explanatory power of personal norms, "VBN does not seem to be well specified and does not identify the relations between its concepts properly" (Kaiser, Hubner, & Bogner, 2005, p. 2164). Despite these flaws, some researchers may view VBN as a more holistic theory than the TPB or NAT because it integrates concepts from NAT with the New Environmental Paradigm scale and concepts from the Schwartz Value System.

The Accuracy of Models

When attempting to predict GPB, the models based on the TPB proved to be the most accurate. They were also slightly more accurate when attempting to predict a consumer's intention to purchase a green product. The reason for this may be that the TPB is the only theory that addresses the temporal and spatial dilemmas of PEB.

Alternatively, the TPB may have proved to be more accurate than VBN or NAT because models that utilize salient questionnaire items are more accurate than models that utilize intuitively selected questionnaire items. More specifically, I'm referring to salient belief statements, attitude objects, and reference groups. According to Ajzen (1991), if the questionnaire items within an independent variable (i.e., concept) are intuitively selected, rather than elicited from qualitative research, it's less likely that they will correlate with the dependent variable. This tends to be the case because intuitively selected items are more likely to include associations that many people in a population, for various reasons, don't actually concentrate on during the situation under investigation (Ajzen, 1991). Plus, if both collective and individual interests surface in the qualitative research, then researchers will unintentionally address the social dilemma that almost always characterizes GPB.

Then again, the primary reason why the TPB outperformed VBN and NAT may be that models that can be described as tall and skinny are more accurate than short, fat models. If you look at the schematics of each theory, the concepts within the TPB are all placed within two levels of proximity to

behavioral intention, creating a relatively tall and narrow shape that resembles two towers. The concepts within VBN, in contrast, are placed within a wide psychological space and only two out of the seven concepts in VBN fall within the first two levels of proximity to behavior. I will refer to this type of model structure as the bridge format. If the two tower format is more accurate than the bridge format, then one would expect the concepts that VBN adds to the backend of the concepts it borrows from NAT to only slightly increase the median predictive value of the original theory. As expected, the ability of VBN to predict behavioral intent, as compared to NAT, only increases from .46 to .52. Meanwhile, the ability to predict actual GPB only increases from .19 to .24. These increases are quite modest for adding four new concepts to a theory. Most researchers would expect to see much larger gains in the median values.

The results also suggest that NAT is the least accurate theory. The explanatory power of NAT, however, is almost certainly under-represented because most of the empiricists who have used NAT to investigate GPB ignored a majority of the concepts originally posited. In fact, the empiricists in this sample tended to employ a simplified model of NAT that is similar to the schematic diagram displayed below.

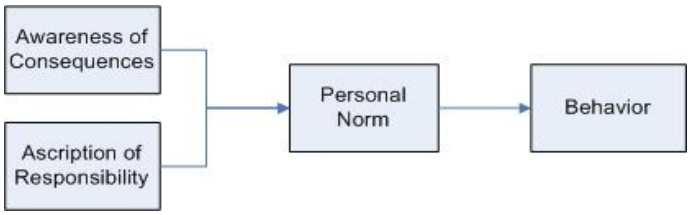

Figure 13. A simplified model of Norm Activation Theory that's commonly applied in empirical research on GPB

The Intention-Behavior Gap

As stated in the results section, the spread in r^2 values gets significantly bigger and the measures of central tendency significantly decrease when evaluating the ability of models to accurately predict actual GPB, as opposed to behavioral intent. This pattern of decreasing predictive value makes sense when you take into consideration that the accuracy of these three theories may be repressed because none of them incorporate concepts related to knowledge, attention (i.e., physiological arousal), habit, or facilitating conditions (i.e., external factors). It seems reasonable to argue that these concepts would have independent effects on GPB that would complement the intention or personal norm construct. In other words, all of these social-psychological theories have significant room for improvement in terms of being comprehensive.

The reason the TPB is able to maintain most of its explanatory power, while VBN and NAT experience substantial drop-offs, may be that the TPB is more likely to address individual interests that can be described as egoistic or self-enhancing. Although the TPB does not explicitly require researchers to address beliefs about the egoistic consequences of GPB (Ajzen, 1991), researchers that follow the measurement principle of salience will often address these beliefs in their questionnaires because they surface during the qualitative research. Similarly, the behavioral intention construct in the TPB is a more holistic conceptualization of the primary antecedent to behavior that includes dimensions of desire, self-expectations, and a willingness to exert effort (Francis et al., 2004). The primary antecedent to behavior in VBN

and NAT, in contrast, is the personal norm construct which is conceptualized as a feeling of moral obligation based on a personal sense of right and wrong (Schwartz, 1977). Thus, the antecedent to actual behavior in VBN and NAT is just a measure of the altruistic motivation behind GPB. VBN and NAT do a fairly good job of predicting this altruistic aspect of intention. But their concepts do not seem to be able to predict actual GPB behavior near as well as the TPB. Thus, the results suggest that a consumer's beliefs about the egoistic consequences of GPB are a powerful motive behind his or her actual purchasing behavior. It's important to note that the egoistic consequences I'm referring to are not limited to utilitarian outcomes, as they include the psychological satisfaction generated from complying with social norms as well.

The Spread of Predictive Values

Paul Stern and his colleagues hypothesize that the causal factors that are important for PEB vary across populations and specific types of PEB (Stern, 2000). So what motivates consumers to purchase green electronics may be very different than what motivates consumers to purchase organic food. And what motivates Germans to purchase organic food may be very different than what motivates Americans to do the same. If this is true and the theories are in fact atomistic when applied to GPB, then one would expect the distribution of r^2 values in this sample to have a high degree of spread. High r^2 values would be expected to represent empirical studies that focused on shopping situations where the missing constructs don't matter, whereas low r^2 values would be expected to represent studies that focused on shopping

situations where the missing constructs do matter. Thus, missing concepts and the absence of a comprehensive meta-model may be the primary reason why there is consistently a high amount of spread in the data assessing accuracy. Plus, the spread is exacerbated when attempting to explain actual GPB. Therefore, a majority of these missing concepts seem to be antecedents to behavior, rather than antecedents to intention.

Chapter 8

ORIGINALITY

Theoretical Contributions

This study provides a theoretical basis for modifying prominent theories from social-psychology to be more appropriate for research on GPB. The qualitative results suggest neither the TPB, NAT, or VBN are sufficiently comprehensive. More specifically, the results suggest researchers should add concepts to these theories related to sex appeal, habits, knowledge, attention, efficacy, and descriptive social norms. Thus, these theories should only be viewed as a foundation or starting point for empirical research on GPB.

This study also provides an empirical basis for modifying prominent theories from social-psychology to be more accurate and reliable when applied to GPB. The results point researchers who are interested in explanatory theories of GPB in several new directions.

First, NAT seems like a promising theory because of the strong alignment between its concepts and the concepts commonly used to explain PEB. The low predictive value of models based on highly simplified interpretations NAT, however, suggest that it won't be able to yield high r^2 values until researchers employ more comprehensive interpretations than the status quo. In order to maintain its ability to yield reliable r^2 values as the models become more complex, however, future research should also seek to a) identify best practices for operationalizing its concepts and b) develop a

mathematical equation that describes the relationships among its concepts in a more precise manner.

Second, the four concepts that VBN adds to the backend of NAT have not added very much predictive value to the original theory when they are applied to GPB. Thus, VBN should be abandoned in research on GPB and researchers should look for other ways to improve the predictive value of NAT.

Third, the high amount of spread in r^2 values suggests social-psychological theories are capable of making accurate predictions when applied to GPB. But all of them seem to be missing important concepts that hold a significant amount of explanatory power when applied to certain populations or product categories. These findings provide further support to the previously mentioned notion that none of them are sufficiently comprehensive. As a result, future research should seek to integrate the prominent theories in social-psychological and create new meta-models. These meta-models would be more comprehensive than the theories of today and thereby, capable of accurately predicting GPB in a more reliable manner.

Fourth, the significant decrease in explanatory power that occurs in existing models when they go from predicting intention to predicting actual behavior points future researchers toward social-psychological theories that have multiple antecedents to behavior. For this reason, researchers may want to pay more attention to the TIB in the future. The TIB offers the most holistic framework for explaining behavior and it addresses the concept of attention, which is the most proximal concept to behavior in the levels of

causality framework for PEB. Thus, the TIB has the capacity to help researchers conceptualize what factors, other than intention, are most likely to directly influence behavior. NAT can also provide some guidance on this front. NAT, when reviewed in detail, indicates there's a direct determinant of behavior that is unique to helping behavior. More specifically, as I have interpreted it, NAT posits that the perception of exploitation has a direct, independent influence on behavior when collective interests are at hand. Future research should empirically assess the strength of the postulated relationships between the aforementioned concepts and GPB.

Overall, since a majority of empirical studies on GPB in the last 20 years have focused on testing one or two of these competing social-psychological theories in a particular situation, a new focus on theory integration would represent a shift in the direction of research aimed at explaining GPB. Moreover, the TIB and the richness of NAT have been largely ignored by the researchers who have investigated GPB thus far. Therefore, the results of this study suggest that researchers interested in explaining GPB should adopt a new research path that is somewhat divergent from the type of research that has been conducted over the past 20 years. Although it's not recognizable in empirical studies on GPB, these trends have already begun in other domains of PEB research such as transportation mode choice (Aarts, Verplanken, & Knippenberg, 1998; Bamberg & Schmidt, 2003; Hunecke, Blobaum, Matthies, & Hoger, 2001; Verplanken et al., 1998). Similarly, the field of ecological economics has

started to integrate concepts from NAT into the homo economicus models that are traditionally used in economics (Turaga et al., 2010).

In summary, based on the results of this study, I recommend future research on GPB focuses on the three following research questions:

1. How can key social-psychological theories (e.g., TIB, NAT, SVS, TPB, VBN, PMT) be modified or integrated with each other to create a customized model for green purchasing behavior (or any other specific type of PEB)?
2. How can concepts from traditional purchasing models be integrated with social-psychological theories to create a customized model for green purchasing behavior?
3. According to the empirical record, what concepts from empirically-driven PEB research have proven to significantly improve the predictive value of an established theory from social-psychology?

Practical Contributions

Research practitioners. This study provides an empirical basis for selecting a theory from social-psychology to research GPB. The quantitative results suggest the TPB has the strongest supporting evidence behind it and thus, it's the best theory for researchers to start from when they are developing models to explain GPB. In addition, the TPB's dominance in accuracy performance (i.e. predictive value) suggests that green purchasing researchers should adopt the TPB's measurement principles of salience and correspondence, even if their model is primarily based on one of the other social-psychological theories.

The empirical assessment also identified a couple best practices for operationalizing theories from social psychology. First, my review of the

empirical studies used in this analysis suggests that when researchers draw on an older theory to develop their models, they seem to overlook the original publications that first posit a theory and opt to base their models on the ones used in other empirical studies. This practice can cause empiricists to unintentionally ignore concepts. Based on the sample of empirical studies used in this analysis, theories that don't describe its concepts or relationships in a very precise way seem to be vulnerable to this type of oversight. Models based on NAT, for instance, are often reduced to a mere three concepts out of the roughly nine concepts Schwartz originally posited (Schwartz, 1977). Models based on the TPB, on the other hand, usually included a majority of the concepts that Ajzen originally posited (Ajzen, 1991). As a result, the TPB had a clear advantage in the empirical assessment that was conducted in this study. And to no surprise, the TPB proved to be the most accurate theory, while NAT proved to be the least accurate theory. Why? Well, as noted in the discussion section, one of the differences between them is that NAT is written like a narrative, whereas the TPB is anchored in mathematical equations and schematic diagrams. Thus, the results suggest that when researchers posit a behavioral theory, they should accompany their textual descriptions with equations and schematic diagrams to ensure the theory reaches its full potential in terms of yielding explanatory power. The inferior accuracy of NAT also suggests that when empiricists are building a model based on a social-psychological theory, they should go back and review the publications that originally posited a theory and then strive to preserve as many of the original concepts as possible.

Second, the high amount of spread in r^2 values suggests there are opportunities for social-psychological theories to achieve strong predictive value; but this potential is often not meet. In the case of TPB, the models that yielded low r^2 values often made poor methodological choices. This is surprising because, in addition to the detailed guidelines that were provided by the original authors, Francis et al (2004) wrote a 42 page instruction manual on how to construct a questionnaire based on the TPB. This document identifies several best practices such as the fact that intention has proven to be a multi-dimensional construct that is most reliably measured using three items that respectively pertain to expectations, wants, and plans (Francis et al., 2004). It also demonstrates that measurement guidelines are readily available. Yet, the models based on the TPB were the least reliable, meaning they had the largest sample range and inter-quartile range of r^2 values. This lack of reliability can be partially attributed to poor methodological choices. The poor choices indicate that some of the researchers investigating GPB aren't drawing on the aforementioned guidelines to help them operationalize the concepts within the TPB. Thus, whenever researchers are applying a theory from social psychology to GPB, I recommend they search for measurement guidelines and review them (when available) prior to constructing their data collection instruments.

Industry professionals. Now let's turn our attention to how the results can be applied "in the real world". The main takeaway is that marketing professionals should not be emphasizing the greenness of a green product in its promotional materials. A credible green claim is obviously a necessary

component so that consumers can identify the product as a green product in the first place. But it's clearly not sufficient for motivating behavioral change. The TPB's ability to make accurate predictions suggests that marketing materials should target beliefs about individual control and social norms, in addition to emphasizing that the ownership or use of a green product will ensure positive future outcomes.

The later sounds like a fairly obvious conclusion. Yet, individual benefits are often ignored in green marketing. How many times have you seen a commercial for a green product, such as the Green Works stain remover, that showed it working more effectively than an industry leader like Shout? These types of commercials are omnipresent for normal laundry products. But it's extremely rare to see one that includes a green product in the comparison. The success of the TPB suggests that green marketers should embrace this traditional format and target consumers expectations of positive future outcomes that will benefit themselves and the environment.

The success of the TPB also implies marketers can influence a consumer's intent to purchase a green product by targeting beliefs about injunctive social norms. Injunctive norms refer to the degree to which consumers believe that people important to them think they ought to purchase a green product. This means, among other things, that personal recommendations are likely to motivate consumers to search for a green product. Hence, it would be wise for marketing professionals to invest in word of mouth marketing tactics such as the ability for consumers to "like" your green product or share it with their friends on social media platforms.

According to the TPB, once an intention to purchase a particular green product is established, control beliefs can both reinforce this intention and encourage actual GPB as well. Control beliefs include a consumer's perceptions of product availability, product affordability, and their own ability to make informed choices (Lau & Chan, 2001). Hence, it would be wise for marketing professionals to invest in television and print advertisements that a) show favorable price comparisons between the green product and "the leading brand" and b) tell consumers what retail chains they can count on to carry the green product. Alternatively, marketers may want to invest in advertisements that tell humorous stories about the brand boosting a consumer's confidence in their ability to purchase a product that's truly green. For instance, a consumer who used to be confused about which green claims matter now feels like he or she knows how to select products that will make a difference because of the information your company provided.

In summary, the current eco-label strategy is not going to get the job done. Eco-labels identify green products in the marketplace. But they don't influence the beliefs systems that motivate consumers to actually buy green products. In order to sell green products, marketing professionals need to communicate with consumers on a much broader range of issues than just how green or environmentally friendly a product is. As it turns out, some of the topics highlighted by the TPB as particularly important to address in green marketing materials closely resemble the foci of traditional messaging that marketers use to promote regular products.

Policy makers. Government officials may find the results to be useful for crafting new policies that encourage consumers to buy green products. While marketing professionals are well-equipped to influence consumer perceptions, policy makers are well-positioned to influence the actual shopping situation. Since perceptions are a simplified interpretation of reality, improving the actual experience of shopping for green products can have a major impact on consumers' attitudes towards the act of purchasing green products.

The success of the TPB suggests policy makers should focus on consumers' attitudes towards behavioral control. In the case of green purchasing behavior, these attitudes are often rooted in beliefs about product availability, product affordability, and the availability of information about response efficacy (i.e., product-level environmental performance information) (Lau & Chan, 2001).

Beliefs related to product affordability can be addressed through consumer-facing rebate programs such as cash for clunkers. These rebate programs are likely to be successful for other green "high ticket items" such as horizontal-axis washing machines and LED light bulbs.

Voluntary partnership programs similar to the SmartWay and Design for the Environment certification programs administered by the U.S. Environmental Protection Agency have the potential to address product availability beliefs. In their current form, however, I suspect these two programs have had little success in motivating behavioral change. In order to change purchasing behavior, programs like these can't just validate the

voluntary disclosures of companies and maintain an online registry of what products meet their eligibility criteria. They also need provide consumers with procedural knowledge and grab their attention at the point of sale.

Policy makers may want to consider awarding grants to the organizations that come up with the best proposals for building a new retail channel to exclusively purchase 3rd party certified goods. Policy makers should also consider awarding grants to the organizations that come up with the best ideas for packaging labels or in-store signage that 1) specify what environmental impact a certification addresses and 2) explain how effective a certified product is at improving environmental conditions. Investments like these provide tools, know-how, and information about positive future outcomes that are likely to improve consumers' attitudes towards purchasing green products and the level of control consumers' feel they have in green purchasing decisions. Moreover, the high predictive value of the TPB in this study suggests that improving these attitudes will translate into actual green purchasing behavior.

Chapter 9

CONCLUSION

This study assessed three prominent theories in social psychology in terms of their attractiveness to empiricists investigating green purchasing behavior (GPB) and the strength of empirical evidence behind them when applied to GPB. A qualitative assessment of the TPB, NAT, & VBN was conducted to evaluate a) how well the phenomenon and concepts in each theory match the characteristics of PEB and b) how well the assumptions made in each theory match common assumptions made in purchasing theory. Then a quantitative assessment of these three theories was conducted in which the r^2 values and methodological parameters (e.g., sample size, behavioral measures) were collected from a sample of 21 empirical studies on GPB. The purpose was to evaluate the accuracy and generalize-ability of empirical evidence.

In the qualitative assessment, each theory appears to have its advantages and disadvantages. The TPB is the best fit for the PEB phenomenon, while NAT has the most comprehensive coverage of PEB concepts. None of the theories, however, address the concepts that are theorized to be most proximal to PEB (e.g., attention) or the full set of common purchasing assumptions.

In the quantitative assessment, the TPB takes home the triple crown as it proves to 1) create the most accurate models 2) be supported by the most generalize-able empirical evidence and 3) be the most attractive theory to empiricists. Although the TPB establishes itself as the best foundational

theory for an empiricist to start from when building a model to explain GPB, it's clear that a more comprehensive model is needed to improve our understanding of GPB. This need is evident in the large spread of r^2 values among empirical studies of GPB and in the large drop off that occurs when going from predicting intention to predicting actual GPB.

There is a large amount of diversity among the five social-psychological theories reviewed towards the beginning of this study. However, they all assume consumers act in their own self-interest. Despite differences in terminology, some of them also share key concepts that are related to ideas like efficacy or an appraisal of costs and benefits. These commonalities provide touch points between theories and suggest there are ample opportunities to integrate concepts from multiple social-psychological theories into more comprehensive meta-models that are customized for GPB. The TIB appears to be well equipped to absorb the TPB for more comprehensive models, while NAT appears to be well positioned to absorb PMT. But the TIB is the only theory that highlights the importance of consumer habits and the attention-grabbing ability of messaging at the point of sale.

Many of these trends have already started to occur in other domains of PEB research such as transportation mode choice (Hunecke et al., 2001). Similarly, models in social-psychology are starting to converge with models in ecological-economics (Turaga et al., 2010). Thus, researchers are beginning to recognize the predictive value of concepts within competing or historically disconnected models for explaining pro-environmental consumer behavior.

It's important for trans-disciplinary models of GPB to continue to become more accurate and reliable so that marketing professionals, product developers, and policy makers can better understand how to encourage consumers to buy green or environmentally-preferable products. Right now, the predictive value of social-psychological models is inconsistent and we often can't explain over 50% of the variance in self-reported GPB. This indicates that models based on only one of the three social-psychological theories examined here do not account for all the major factors that determine GPB in reality. Due to this knowledge gap, we often don't know what belief sets to target or how to prioritize them in marketing materials aimed at motivating consumers to buy green products. Although r^2 values of .5 are more than adequate for publishing academic literature in the social sciences, they are not sufficient for helping us reverse the trend of rapidly declining ecosystem services.

Models based on the TPB demonstrate that social-psychological models have the capacity to achieve predictive values much higher than .5. Twenty five percent of the empirical studies that employed the TPB achieved an r^2 value between .57 and .95. Through heavy integration and sophisticated operationalization, new meta-models may have the capacity to yield high r^2 values on a much more consistent basis. More specifically, I speculate that meta-models will have the capacity to consistently predict about 75% of self-reported behavior if they 1) follow the TPB's measurement principles of salience and correspondence and 2) are structured in the TPB's two tower format. From here, a collection of empirical studies could identify which

concepts are of outmost importance within different geographic and product category contexts.

Right now, due to the spread of predictive values in empirical research, I think marketing professionals may be slightly skeptical about whether social-psychological models will actually help them communicate to the consumers in their specific target market. But new meta-models are on the horizon and I think they are capable of producing highly accurate results on a much more consistent basis. Marketing professionals and other decision makers are bound to be more confident in this enhanced level of knowledge and understanding. I surmise they will also find these insights to be tremendously helpful for developing green marketing strategies and more broadly, using the purchasing power of consumers to pull more sustainable products out of our supply chains.

REFERENCES

Aarts, H., Verplanken, B., & Knippenberg, A. (1998). Predicting Behavior From Actions in the Past: Repeated Decision Making or a Matter of Habit? *Journal of Applied Social Psychology*, *28*(15), 1355–1374. doi:10.1111/j.1559-1816.1998.tb01681.x

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision*, *50*, 179–211. Retrieved from http://www.cas.hse.ru/data/816/479/1225/Oct 19 Cited %231 Manage THE THEORY OF PLANNED BEHAVIOR.pdf

Amundson, S. (1998). Relationships between theory-driven empirical research in operations management and other disciplines. *Journal of Operations Management*, *16*(4), 341–359. doi:10.1016/S0272-6963(98)00018-7

Armitage, C. J., & Conner, M. (2001). Efficacy of the Theory of Planned Behaviour: a meta-analytic review. *The British journal of social psychology / the British Psychological Society*, *40*(Pt 4), 471–99. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11795063

Bamberg, S., & Schmidt, P. (2003). Incentives, Morality, Or Habit?: Predicting Students' Car Use for University Routes With the Models of Ajzen, Schwartz, and Triandis. *Environment & Behavior*, *35*(2), 264–285. doi:10.1177/0013916502250134

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American psychologist*, *37*(2), 122–147. Retrieved from http://psycnet.apa.org/journals/amp/37/2/122/

Biddle, T. (2008). *Ethical Consumerism and Techniques of Neutralisation in the Hybrid Electric Car Market: An Application of the Theory of Planned Behaviour*. Retrieved from http://edissertations.nottingham.ac.uk/2445/1/08MScInternationalBusinesslixtb5.pdf

Blackwell, R., Miniard, P., & Engel, J. (2006). *Consumer Behavior* (p. 4). Mason, Ohio: Thomson Business and Economics.

Clark, W. (2007). Sustainability Science : A room of its own. *PNAS*, *104*(6), 1737–1738.

Dunlap, R., Van Liere, K., Mertig, A., & Jones, R. (2000). Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. *Journal of Social Issues*, *56*(3), 425–442.

Fishbein, M. (1963). An investigation of the relationships between beliefs about an object and the attitude toward the object. *Human Relations*, *16*(August), 233–240.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Francis, J., Eccles, M. P., Johnston, M., Walker, A., Grimshaw, J., Foy, R., Kaner, E. F. S., et al. (2004). *CONSTRUCTING QUESTIONNAIRES BASED ON THE THEORY OF PLANNED BEHAVIOUR A MANUAL for HEALTH SERVICES RESEARCHERS* (pp. 1–42).

Frick, J., Kaiser, F., & Wilson, M. (2004). Environmental knowledge and conservation behavior: exploring prevalence and structure in a representative sample. *Personality and Individual Differences*, *37*(8), 1597–1613. doi:10.1016/j.paid.2004.02.015

Gardner, G., & Stern, P. (1996). *Environmental problems and human behavior* (1st ed.). Boston: Allyn & Bacon.

Grothmann, T., & Patt, A. (2005). Adaptive capacity and human cognition: The process of individual adaptation to climate change. *Global Environmental Change Part A*, *15*(3), 199–213. doi:10.1016/j.gloenvcha.2005.01.002

Holdren, J. (2000). Environmental Degradation: Population, Affluence, Technology, and Sociopolitical Factors. *Environment*, *42*(6), 4–5.

Hunecke, M., Blobaum, A., Matthies, E., & Hoger, R. (2001). Responsibility and Environment: Ecological Norm Orientation and External Factors in the Domain of Travel Mode Choice Behavior. *Environment and Behavior*, *33*(6), 830–852. doi:10.1177/00139160121973269

Jackson, T. (2005). Live Better by Consuming Less? Is there a "double dividend" in sustainable consumption? *Journal of Industrial Ecology*, *9*, 19–36.

Jansson-Boyd, C. (2010a). Consumer decision-making and brand loyality. *Consumer Psychology* (pp. 131–146). McGraw-Hill Education. Retrieved from http://site.ebrary.com/lib/asulib/docDetail.action?docID=10394842

Jansson-Boyd, C. (2010b). Attitudes. *Consumer Psychology* (pp. 82–95). McGraw-Hill Education. Retrieved from http://site.ebrary.com/lib/asulib/docDetail.action?docID=10394842

Jansson-Boyd, C. (2010c). Consumer memory and learning. *Consumer Psychology* (pp. 14–37). McGraw-Hill Education. Retrieved from http://site.ebrary.com/lib/asulib/docDetail.action?docID=10394842

Johnson, R., & Bhattacharyya, G. (2006). Organization and Description of Data. *Statistics Principles and Methods* (5th ed.). John Wiley & Sons, Inc.

Kaiser, F., Hubner, G., & Bogner, F. (2005). Contrasting the Theory of Planned Behavior With the Value-Belief-Norm Model in Explaining Conservation Behavior. *Journal of Applied Social Psychology*, *35*(10), 2150–2170. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1559-1816.2005.tb02213.x/abstract

Kaiser, F., & Wilson, M. (2004). Goal-directed conservation behavior: the specific composition of a general performance. *Personality and Individual Differences*, *36*(7), 1531–1544. doi:10.1016/j.paid.2003.06.003

Kates, R. (2000). Population and Consumption: What we Know, What We Need to Know. *Environment*, *42*(3), 10–19.

Kates, R., Clark, W., Corell, R., Hall, J., Jaeger, C., Lowe, I., McCarthy, J., et al. (2001). Sustainability science. *Science*, *292*(5517), 641–642. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=257359

Lau, L., & Chan, R. (2001). Explaining Green Purchasing Behavior: A Cross-Cultural Study on American and Chinese Consumers. *Journal of International Consumer Marketing*, *14*, 9–40.

Louis, A. (n.d.). Qualtrics User Manual. Qualtrics.

Martin, B., & Simintiras, A. C. (1995). The impact of green product lines on the environment: does what they know affect how they feel? *Marketing Intelligence & Planning*, *13*(4), 16–23. Retrieved from http://www.emeraldinsight.com/journals.htm?articleid=854296&show=abstract

Miller, J. (1965). Living Systems: Basic Concepts. *Behavioral Science*, *10*(3), 193–237.

Norman, P., Boer, H., & Seydel, E. (2005). Protection motivation theory. In M. Conner & P. Norman (Eds.), *Predicting Health Behaviour* (2nd ed., pp. 81–126). McGraw-Hill Education. Retrieved from http://site.ebrary.com/lib/asulib/docDetail.action?docID=10161300

Ohme, R., Matukin, M., & Pacula-lesniak, B. (2011). BIOMETRIC MEASURES FOR INTERACTIVE ADVERTISING. *Journal of Interactive Advertising*, *11*(2), 60–72.

Percy, S., & Lubchencho, J. (2005). *Ecosystems and human well–being: Opportunities and challenges for business and industry* (pp. 1–36).

Retrieved from http://www.who.int/entity/globalchange/ecosystems/ecosys.pdf

Reid, W., Mooney, H., Cropper, A., & Capistrano, D. (2005). *Living beyond our means: Natural assets and human well-being: Statement from the board*. Retrieved from http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Living+Beyond+Our+Means+NATURAL+ASSETS+AND+HUMAN+WELL-BEING+Statement+from+the+Board#0

Rogers, R. (1975). A Protection Motivation Theory of Fear Appeals and Attitude Change. *The Journal of Psychology*, *91*, 93–114.

Roser-renouf, C., & Nisbet, M. (2008). THE MEASUREMENT OF KEY BEHAVIORAL SCIENCE CONSTRUCTS IN CLIMATE CHANGE RESEARCH. *IJSC*, *3*, 37–95. Retrieved from www.ijsc-online.org

Schwartz, S. (1973). Normative explanations of helping behavior: A critique, proposal, and empirical test. *Journal of Experimental Social Psychology*, *9*, 349–364. Retrieved from http://www.sciencedirect.com/science/article/pii/0022103173900711

Schwartz, S. (1977). Normative Influences on Altruism. (L. Berkowitz, Ed.)*Advances in Experimental Social Psychology*, *10*, 221–279.

Schwartz, S. (1994). Are there universal aspects in the structure and contents of human values? *Journal of social issues*, *50*(4), 19–45. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1540-4560.1994.tb01196.x/abstract

Staats, H. (2003). Understanding proenvironmental attitudes and behavior: An analysis and review of research based on the theory of planned behavior. *Psychological theories for environmental issues* (pp. 171–201).

Stern, P. (2000). Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues*, *56*(3), 407–424.

Stern, P., Dietz, T., Abel, T., Guagnano, G., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human ecology review*, *6*(2), 81–97. Retrieved from http://www.humanecologyreview.org/Human Ecology/HER_6,2,1999.pdf?q=human-synergetics#page=87

Triandis, H. (1977). *Interpersonal Behavior* (pp. 1–329). Monterey, CA: Brooks/Cole Publications Co.

Triandis, H. (1980). Values, attitudes, and interpersonal behavior. In H. Howe & M. Page (Eds.), *Nebraska Symposium on Motivation, 1979* (Vol. 27., Vol. 27, pp. 195–259). Lincoln, NE: University of Nebraska Press.

Turaga, R. M. R., Howarth, R. B., & Borsuk, M. E. (2010). Pro-environmental behavior: rational choice meets moral motivation. *Annals of the New York Academy of Sciences*, *1185*, 211–24. doi:10.1111/j.1749-6632.2009.05163.x

Verplanken, B., Aarts, H., Van Knippenberg, A., & Moonen, A. (1998). Habit versus planned behaviour: a field experiment. *The British journal of social psychology / the British Psychological Society*, *37 (Pt 1)*, 111–28. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/9554090